



OFFICE OF ENVIRONMENTAL QUALITY CONTROL

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February 16, 2017

TO: Virginia Pressler, M.D.
Director of Health

FROM: Scott Glenn
Director of Environmental Quality Control 

SUBJECT: Review of and Recommendation on the Final Environmental Impact Statement for the
Hawai'i Dairy Farm

At the request of the Department of Health, the Office of Environmental Quality Control (OEQC) reviewed the Hawai'i Dairy Farm final environmental impact statement (Final EIS). Section 343-5(e), Hawai'i Revised Statutes (HRS) states that the OEQC, "when requested by the applicant or agency, may make a recommendation as to the acceptability of the final statement."

Based on the criteria in Section 11-200-23, Hawai'i Administrative Rules (HAR), and the following analysis, the OEQC recommends that the Department of Health issue a non-acceptance determination.

BACKGROUND

Project: Hawai'i Dairy Farm Final Environmental Impact Statement

Location: Māhā'ulepū, Kaua'i, District of Koloa

Tax Map Keys: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

Permits & Approvals: County of Kaua'i: Building Permit
State of Hawai'i: Department of Land and Natural Resources, State Historic Preservation Division, Chapter 6E, Hawai'i Revised Statutes, Historic Preservation Review; West Kaua'i Soil and Water Conservation District, Conservation Plan; State of Hawai'i: Department of Health, Environmental Health Administration: Clean Water Branch, National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit; Wastewater Branch, Waste Management Plan; NPDES Concentrated Animal Feeding Operation; Individual Wastewater Permit; Sanitation Branch, Milk Producer Permit.

Applicant: Hawaii Dairy Farm, LLC, P.O. Box 1690, Koloa, HI 96756

Landowner: Māhā'ulepū Farm, LLC, 3-1850 Kaumuali'i Highway, Lihū'e, HI 96766

Approving Agency: State of Hawai'i, Department of Health, 1250 Punchbowl Street, Honolulu, HI 96813

Per the Final EIS, the project purpose is to establish a sustainable, pastoral rotational-grazing dairy farm that would increase current milk production, bolster Hawaii's declining dairy industry, and reduce reliance on imported milk from the mainland United States. The rotational-grazing dairy system would utilize 100 percent of all manure on site as natural fertilizer to grow grass. The applicant states that this method would reduce imported fertilizer and feed and minimize potential impacts to the environment.

The applicant leases agricultural land in Māhā'ulepū Valley on the south shore of Kaua'i. The 557-acre site consists of portions of three parcels leased from Māhā'ulepū Farm LLC. The applicant plans to establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley to produce milk for Hawaii families. The applicant has committed to establish a herd of up to 699 mature cows. Future possible expansion of the herd up to 2,000 mature dairy cows is an option following demonstrated success of the rotational grazing system and a better understanding of the carrying capacity of the pasture.

A summary of the proposed mitigation measures are included as an attachment (Attachment 1).

ACCEPTABILITY ANALYSIS

Section 11-200-23, HAR, sets forth the criteria for evaluating the acceptability of a Final EIS. Evaluation is based on whether the Final EIS represents an information instrument that fulfills the definition of an EIS, adequately describes all identifiable environmental impacts, and satisfactorily responds to review comments. An EIS by definition in Section 11-200-2, HAR, must fully comply with Subchapter 7 of Chapter 11-200, HAR. Subchapter 7 covers Sections 11-200-14 through -23, HAR. A statement must meet the following criteria to be deemed an acceptable document:

1. Procedures for assessment, consultation process, review, and preparation and submission have all been completed satisfactorily;
2. Content requirements have been satisfied; and
3. Comments submitted during the review process have received responses satisfactory to the approving agency, and have been incorporated into the statement.

PROCESS REQUIREMENTS

Procedures are specifically prescribed in Sections 11-200-15, -20, -21, and -22, HAR. The EIS process provides for an applicant to prepare and have the OEQC publish an EIS Preparation Notice (EISPN), Draft EIS, and Final EIS in the periodic bulletin (i.e., The Environmental Notice); a public comment period to be conducted following publication of the EISPN and the Draft EIS; and for the approving agency to issue a determination of acceptance or nonacceptance and have the OEQC publish the determination in the periodic bulletin.

On January 9, 2015, the applicant submitted an EISPN to the OEQC, which the OEQC published in the periodic bulletin on January 23, 2015. The applicant began with an EISPN per Act 172 (2012), which allows for an agency to authorize an applicant to choose not to prepare an environmental assessment.

Comment letters and requests to become consulted parties received during the ensuing 30-day period pursuant to Section 11-200-15, HAR were reproduced along with responses in the Draft EIS.

On May 26, 2016, the applicant simultaneously submitted the Draft EIS to both the Department of Health and the OEQC. The notice of availability for comment on the Draft EIS was published in the June 8, 2016, issue of the periodic bulletin. The comment period was for 45 days.

The applicant and the Department of Health received 205 comments on the Draft EIS. Reproduction of these comments and responses have been included in seven volumes of the Final EIS.

On January 17, 2017, the applicant simultaneously submitted the Final EIS to the Department of Health and the OEQC, which the OEQC published in the February 8, 2017 issue of the periodic bulletin.

On February 14, 2017, the applicant requested that the Department of Health grant an extension to the Final EIS review period pursuant to Section 11-200-23(d), HAR. On the same day, the Department of Health granted the applicant's request extending the review period to Friday, February 24, 2017.

The OEQC finds that the Final EIS fulfilled the process requirements in Subchapter 7 as set forth in Section 11-200-23(b)(1).

CONTENT REQUIREMENTS

Content requirements are specifically prescribed in Sections 11-200-17 and 11-200-18, HAR. Tables 1 and 2 list the section paragraph, summary, and where in the Final EIS the information is located.

Table 1. Section 11-200-17, HAR, Content Requirements; Draft EIS

Paragraph	Summary Description	Final EIS Section
(b)	Summary sheet	Section 1.0
(c)	Table of contents	Volume 1, pp. i-ix
(d)	Statement of purpose and need	Section 2.0, p. 2-7
(e)	Project description	Section 3.0
(f)	Discussion of Alternatives	Section 6.0
(g)	Environmental setting	Section 4.0
(h)	Relationship of the proposed action to land use plans, policies, and controls for the affected area	Section 5.0
(i)	Probable impacts (direct, indirect and cumulative)	Section 4.0
(j)	Relationship between local short-term uses and the maintenance and enhancement of long-term productivity	Section 4.20.3, p. 4-93
(k)	Irreversible and irretrievable commitments and resources	Section 4.20.4, p. 4-94
(l)	Probable adverse impacts that cannot be avoided	Section 4.20.6, p. 4-94
(m)	Mitigation measures	Section 4
(n)	Unresolved issues	Section 4.28, p.4-122
(o)	Identification of consulted parties, and identification of EIS document preparer	Section 7 (Agency and Parties Consulted) Section 8.2 (EIS Preparers)
(p)	Reproductions of comments and responses during EISPN; list of persons or agencies who were consulted but had no comment	Volumes 2, 3, 4, 5, 6, 7, 8 and 9

Table 2. Section 11-200-18, HAR, Content Requirements; Final EIS

Paragraph	Summary Description	Final EIS Section
(1)	Draft EIS revised to incorporate substantive comments	Volume 1
(2)	Reproductions of all letters received	Volumes 2, 3, 4, 5, 6, 7, 8, and 9
(3)	A list of persons, organizations, and public agencies commenting on the draft EIS	See consulted party list, pp. i-xv, Volume 1
(4)	The responses of the applicant to each substantive question, comment, or recommendation received in the review and consultation processes.	Volumes 2, 3, 4, 5, 6, 7, 8, and 9
(5)	Formatted text that allows the reader to easily distinguish changes made to the text of the Draft EIS	Volume 1 (modified Ramseyer format)

After review of the nine volumes of the Final EIS, the OEQC finds that the Final EIS has sections and content addressing each of the items specified in Sections 11-200-17 and 11-200-18, HAR. For the content requirements as set forth in Section 11-200-23(b)(2), the OEQC defers to the Department of Health, which is the subject matter expert and is the one to be satisfied that the content identifies all environmental impacts or adequately analyzes them sufficiently for the Department of Health to be informed for its decision making.

RESPONSES TO COMMENTS REQUIREMENTS

The EIS process provides for two public review and comment periods. The first period, set forth in Section 11-200-15, HAR, runs for 30 days from the date that the OEQC publishes notice of the EISPN in the periodic bulletin. The second period is for the Draft EIS, described in Section 343-5, HRS, and Section 11-200-22, HAR. The Draft EIS comment period runs for 45 days from the date that the OEQC publishes notice of availability in the periodic bulletin. Each of these two periods has differing standards for how an applicant must respond to timely-received comments.

For the EISPN comment period, the applicant must respond to comments received during the 30-day period, described in Section 11-200-15, HAR. As such, responses to comments during this period take the form of general acknowledgement of the information received for the applicant's review and consideration.

The OEQC finds that the applicant responded satisfactorily to all substantive comments made during the 30-day EISPN review and comment period. All comments and responses during this period were reproduced in the Final EIS in Volumes 8 and 9.

For the Draft EIS comment period, the applicant must meet a higher standard of response. The standard is to respond to comments in a point-by-point manner as set forth in Section 11-200-22, HAR that reads in pertinent part: "[t]he response to comments shall include:

- (1) **Point-by-point** discussion of the validity, significance, and relevance of comments; and
- (2) Discussion as to how each comment was evaluated and considered in planning the proposed action." [Emphasis supplied]

While a large part of the comments made during the 45-day comment period were adequately responded to by the applicant, the OEQC found several instances where insufficient information exists to determine if the standard for responsiveness on a Draft EIS comment has been met.

Typically, a commenter sends a detailed comment to the applicant during the EISPN comment period expecting a point-by-point response, even though this is not the required level of response for an EISPN comment. The commenter does not usually receive the applicant's response until the Draft EIS has been published in the periodic bulletin. The commenter reads the applicant's responses to their comments, typically containing an acknowledgement and almost no detailed response. The commenter then resubmits the points raised during the EISPN comment period as a part of its letter to the applicant commenting on the Draft EIS.

For documents with an extensive number of issues such as the present one, the applicant relies on a practice of grouping similar points in all the comments into groups to facilitate the logistics of responding. While such a practice allows similar issues across all comments to be responded to, it may overlook specific points that do not easily fit into the grouped response, such as a request for corrections or specific information. The OEQC found at least four such instances, discussed below, in the Final EIS.

EXAMPLE 1.

Malama Māhā'ulepū comment letter dated July 25, 2016 (Attachment 2).

Page 9 of Malama Māhā'ulepū's letter states "[m]istakes in the history of the area include Captain Cook's journal entry and log in which he describes encountering natives off Māhā'ulepū the evening before he sailed to Waimea where he was able to anchor and land – this is not accurate."

Page 9 of Malama Māhā'ulepū's letter also states that "[w]e recommend rewriting this section (pp. 4-31 – 4-32) to clearly and adequately summarize the work and findings of the Cultural Impact Assessment and correct inaccurate information."

The OEQC was not able to find reference to a journal entry and log of Captain Cook in the text of either the Draft or Final EIS.

Page 6 of the response letter from the applicant under Cultural Practice and Resources does not mention the two points raised above. Pages 4-31 and 4-32 (Attachment 3) of the Final EIS contain no changes from the Draft EIS related to the two points raised above.

Furthermore, page 6 of the response letter states that the State Historic Preservation Division (SHPD) accepted the Archaeological Inventory Survey (AIS) on December 19, 2016 (Appendix G). An examination of Appendix G revealed no text related to the points raised in Malama Māhā'ulepū's comments.

Pursuant to Section 11-200-22(c), HAR, points raised in a comment letter cannot be dismissed without a corresponding response that either affirms or refutes the point. It appears that the applicant has not done either. Also, the SHPD acceptance of the AIS does not obviate the applicant's requirement to refute or affirm the points raised in page 9 of Malama Māhā'ulepū's letter.

EXAMPLE 2.

Eileen Kechloian comment letter dated July 25, 2016 (pages 1-18 reproduced as Attachment 4).

Eileen Kechloian reiterates questions raised in the EISPN comment letter. Throughout pages 1-18 of the Draft EIS comment letter, she itemized specific unanswered questions for which she was now asking for a response. The points raised include the following:

- (a) "What leads HDF to believe that Grove Farms can supply them with 3 million gallons of water per day that they require to operate? When Grove Farms is not a utility company? Saying the water is going to come from your "allocation" of water doesn't cut it. Who allocated it?"
- (b) "What size bond is HDF putting up for cleanup should a natural disaster happen? If there is no bond what is the rationale behind that when anyone who lives here knows it's a matter of when?"
- (c) "What will be done to protect the cows from the extreme heat (over 90) degrees and up to 104 degrees (per page 59 of the waste management plan) of the valley as there are no trees for them, only Norfolk pines lining the driveway?"
- (d) "What steps has HDF taken to keep soil from being washed into the stream during grubbing and grading?"
- (e) "Please cite where you found information that there were concerned citizens over the loss of Ag land that wanted Grove Farms site (HDF) protected under IAL? Grove Farm submitted the property for IAL designation after there [sic] were working with HDF."

The January 3, 2017, response (Attachment 5) did not contain a point-by-point response to the points raised by Eileen Kechloian. The information may be contained in one of the many generic responses in the response letter, but such a response was not apparent to the OEQC.

EXAMPLE 3.

Curtis J. Bedwell, MAI comment letter dated July 20, 2016 (Attachment 6) raised the following points:

- (a) "Page 4-51 states 'results of technical studies and the findings of the EIS show no unmitigated nuisances that would affect property values as a result of dairy implementation or operations.' Where are these technical studies the DEIS is referring to and where can they be found?"
- (b) "Appendix J of the DEIS, merely states that the dairy will have no impact on the values of property in the region; but where's the analysis that leads to this preposterous conclusion? How was this conclusion determined?"

The January 3, 2017, response (Attachment 7) contains no specific responses to each of the points raised above. An examination of Appendix J of the Draft EIS revealed no specific discussion of analyses supporting the idea that the proposed action will have no impact on property values.

EXAMPLE 4.

Beryl Blaich comment letter dated July 24, 2016 (Attachment 8), notes on page 5 that:

"The draft EIS shall include, where possible, specific reference to the timing of each step proposed to be taken in any mitigation process, what performance bonds, if any, may be posted and what other

provisions are proposed to assure the mitigation measures in fact will be taken.' [HAR 11-200-17(m)] HDF must carry a large environmental insurance policy in order to 'rectify' potential environmental and public health damages. Even a large policy might still provide small compensation for irreparable losses and would need to include funding for remediation. In addition, HDF should establish a social and environmental remediation endowment, partially funded by a portion of milk sales. The existing DEIS assumes there will be no negative impacts to mitigate, and includes no provisions for insurance."

The applicant's response in the January 3, 2017 letter (Attachment 9) contains responses under the headings of "Economic Analysis", "Surface Water Nutrients", "Marine Environment Baseline Assessment", "Comprehensive Monitoring", and "Agricultural Operations". Each of these sections was examined for reference to performance bonds or insurance. The response to the point raised by Beryl Blaich was not apparent to the OEQC. Points cannot be simply dismissed without a corresponding response that either affirms or refutes the point.

For each point raised by a commenter, Section 11-200-22, HAR requires a corresponding point response. The following are additional examples where the OEQC was not able to find a point-by-point correspondence between the points raised in a comment letter and the response.

- Suzanne Kashwaeda, July 23, 2016 – The EISPN response did not address concerns from the EISPN comments regarding the restoration of land should the dairy fail and a marketing plan for male calves. The concerns were raised again in the Draft EIS comment letter. It was not apparent to the OEQC where the corresponding point responses were located.
- John T. Mueller, July 20, 2016 – The EISPN response seems to have no response with regard to the point of the applicant about water pollution and who pays for cleanup. The concerns were raised again in the Draft EIS comment letter. It was not apparent to the OEQC where the corresponding point responses were located.
- Ken Purdy, July 24, 2016 – Commenter noted that the study does not address declines in property values and county tax revenues, noting that "the Koloa/Poipu area brings in over \$213,000,000 per year in hotel/lodging sales." It was not apparent to the OEQC where the corresponding point responses were located.
- Judith C. Rachap, July 18, 2016 – Commenter noted that the EISPN response did not address concerns from the EISPN comments regarding specific questions about pests, herd size, water quality and surface water, among other things. The concerns were raised again in the Draft EIS comment letter. It was not apparent to the OEQC where the corresponding point responses were located.

The OEQC notes that the examples cited indicate a pattern where the applicant's response to specific concerns raised in the EISPN comment letter did not satisfactorily address the commenter's concerns. The result was that the commenter resubmitted the concerns as points for consideration in the Draft EIS, upon which the applicant had an obligation to respond to the concerns in a point-by-point manner, and does not appear to have done so.

With respect to the above instances, the OEQC was not able to determine that the response to comments requirements, as specified in Section 11-200-22, HAR, have been met, pursuant to Section 11-200-23(b), HAR.

MITIGATION MEASURES

The mitigation measures proposed in the Final EIS would seek to minimize the negative economic, social and environmental impacts of the proposed action. The OEQC defers to the subject matter expertise of the commenting agencies and the Department of Health on the adequacy of proposed mitigation measures. Should the Department of Health issue an acceptance determination, the OEQC recommends that the Department of Health direct the implementation of the mitigation measures disclosed in the statement or comparable mitigation measures at the discretion of the approving agencies.

SUPPLEMENTAL EIS CONDITIONS

Should the Department of Health issue an acceptance determination, and should there be a major or substantial change to the proposed action or if different environmental impacts are anticipated following the issuance of the acceptance determination, the OEQC recommends that the Department of Health require a supplemental EIS. Any supplemental EIS must comply with Chapter 343, HRS, and Chapter 11-200, HAR, specifically Subchapter 10.

CONCLUSION

Section 11-200-23, HAR, sets forth the three acceptability criteria: process, content, and comment responses. The applicant clearly did considerable research and engagement on its proposed action.

For process, the OEQC found that the applicant satisfied the procedural requirements.

For content, the OEQC found that the applicant included content in the manner prescribed in Sections 11-200-17 and 11-200-18. However, the OEQC is not a subject matter expert and is unable to affirmatively or negatively state that the applicant identified all environmental impacts or satisfactorily disclosed information sufficient for the Department of Health to make an informed decision.

For responses to comments, the OEQC found that most comments received a point-by-point response, but it is not clear that all comments received such a response. In the absence of clear point-by-point responses, the OEQC is unable to affirm that the applicant met the requirement for the third criterion.

Therefore, the OEQC recommends that the Department of Health issue a non-acceptance determination.

Attachments

- c: Hawaii Dairy Farm
Group 70 International

ATTACHMENT 1

HAWAII DAIRY FARM FINAL EIS PROPOSED MITIGATION MEASURES

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PROPOSED MITIGATION MEASURES FOR THE HAWAII DAIRY FARM FINAL ENVIRONMENTAL IMPACT STATEMENT

The following is a compilation of mitigation measures by resource area which the applicant proposed in the Hawai'i Dairy Farms Final Environmental Impact Statement (Final EIS). Resources for which no mitigation measures are proposed are not included. The Office of Environmental Quality Control (OEQC) organized the information but the text is from the Final EIS. Page numbers next to the section header refer to pages in the Final EIS, while page numbers at the bottom of the page are for this attachment.

Climate (page 4-6)

The scale of Hawaii Dairy Farm (HDF) is not large enough to influence global cycles of solar radiation and the hydrologic cycle. Minimal construction and an increase in ground cover density will not affect climate processes. The Proposed Action will increase vegetative density across the pasture areas, which will hold more moisture than the current intermittent coverage of vegetation across the site. The 557-acre site is not large enough to have a regional influence on climate.

Current climate change models project decreased rainfall on the dry leeward sides of Kaua'i (such as Po'ipū), which will reduce available freshwater resources. Given the degree of uncertainty in the climate change models, the impact on HDF operations cannot be predicted. Nevertheless, future reduction of available freshwater, in conjunction with projected population and visitor growth, is an issue that mandates collaboration by the State and County, with cooperation from water providers and water consumers.

Soils (page 4-14)

Short-term Impacts and Mitigation – Soils

Short-term soil impacts during establishment of the dairy farm will include earthwork for the dairy facility, creating cow raceways, paving key road areas within the dairy facility, improvements to existing drainage systems, and installation of effluent storage ponds and utility infrastructure. The dairy project has been granted an exemption under Section 22.7.6 of the County Sediment and Erosion Control Ordinance by the County of Kaua'i Department of Public Works provided that conservation practices documented in the HDF Conservation Plan are employed.

Soil conservation is a core principal of the Conservation Plan, listed in the Final Environmental Impact Statement (FEIS), Chapter 3, Section 3.2, Conservation Practices. National Resources Conservation Service (NRCS) practice codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. Work to date and future work at HDF has followed the Conservation Plan, which was been approved by the West Kaua'i Soil and Water Conservation District in December 2013.

Best management practices are described in the FEIS at Section 4.17, Surface Water Resources and Nearshore Marine Environment. These practices are documented in the Stormwater Pollution Protection Plan ~~to be~~ submitted as part of the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit Notice of Intent.

Soil loss during construction will be minimized through the various best management practices and controls.

Long-term Impacts and Mitigation – Soils

The soil types in HDF are classified as poorly drained, depleted of nutrients. The initial step to improve soils for sufficient crop growth is to restore nutrients. Nutrients beyond the crop demand will be taken up by the soils, and will begin to build to levels that will be reflected in improved tithe. The soils are suitable for nutrient application, initially a higher percentage of commercial fertilizers followed by increasing organic nutrients from manure as the herd matures. Estimates by the groundwater engineer are two percent of the nitrogen, and one percent of the phosphorus may eventually discharge to the ocean (see FEIS, Section 4.17, Surface Water Resources and Nearshore Marine Environment). The poorly permeable soils allow little movement of groundwater, which provides ample time for denitrification and for biological organisms in the soil to make nutrients available for plants.

Natural Hazards (pages 4-25 through 4-26)

Impacts that would be considered significant related to natural hazards could include:

- Damage to facilities or harm to personnel or livestock from natural hazards; and
- Failure to anticipate and plan for protection of the dairy facility and operations from a natural hazard.

Preparedness is the best mitigation for natural disasters. Structural design of dairy facilities will meet IBC 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

A natural disaster plan has been prepared by the Hawai'i Dairy Farms' manager to address hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is mentioned in the disaster plan only for HDF personnel to maintain awareness. The disaster response plan outlines safety procedures during the event, follow up actions, and emergency contacts for assistance before, during or following the event.

The disaster plan relies upon knowledge of cow behavior. Extensive guidance for livestock protection comes from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. Adapting guidance to specific natural disaster threats is the first step in preparing the HDF disaster response plan. Land managers in the Māhā'ulepū region during hurricanes that affected Kaua'i in 1982 and 1992 observed defoliation of vegetation, and no flooding event in the period following passage of the storms.

For the herd at HDF, which will not be confined within structures, the 470 acres of pasture within the valley would provide the best protection. Evacuation off the farm is not planned. Cows sense security in numbers, and prefer to remain within a group (known as a mob, described in Chapter 3). Mobs will be moved to an appropriate group of paddocks based on the threat. Each paddock is equipped with sufficient drinking water troughs for the number of livestock corresponding to paddock size. Once the threat has passed, mobs will be returned to the next scheduled paddock in the mobs' rotation.

Ditches and culverts will be monitored for blockages or debris dams during high rainfall events. Such debris would be removed to maintain the full capacity of the ditches.

Short-term Impacts and Mitigation – Natural Hazards

Emergency procedures for the construction site will comply with Occupational Safety and Health Administration (OSHA), County of Kaua'i, and State of Hawai'i safety requirements. An emergency preparedness plan for protection of animals has been prepared for HDF internal use. Construction design will meet IBC standards with local amendments. No short-term significant impacts are anticipated related to natural hazards.

Long-term Impacts and Mitigation – Natural Hazards

Geologic and potential natural hazards pose no major constraints to the project. Emergency management procedures and staff training for emergency events will be in place to implement prevention and mitigation should natural hazards occur in the region that may impact the dairy herd or facilities.

There has been no storm event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā'ulepū Valley (see, FEIS, Section 4.1, Table 4.1-2). The effluent pond capacity for the committed herd size of 699 mature dairy cows has been designed well beyond the regulatory requirements, and would provide nearly 1 million additional gallons of storage. As an additional safeguard, a secondary containment berm with an additional capacity of 1,131,000 gallons – representing more than 85 days of effluent with wash water from the 699 mature dairy cow herd, and 30 days of effluent with wash water for the contemplated herd size of up to 2,000 mature dairy cows. – is included in the design. So there are two stages of storage capacity beyond both the regulatory requirements and any recorded rainfall event over the past three decades.

Archaeological and Historic Resources (pages 4-30 through 4-32)

Impacts that would be considered significant related to archaeological and historic resources could include:

- Disturbance or discovery of archaeologic or historic features during construction; and
- Potential future disturbances of historic sites from on-going dairy operations.

Short-term Impacts and Mitigation – Archaeological and Historic Resources

The findings of the current AIS indicate that portions of the project area were used for agriculture in the period after European contact. No pre-contact cultural sites were identified within the project site boundaries. In the unlikely event that archaeological resources are discovered during construction, appropriate procedures will be followed as required in applicable Hawai'i Revised Statutes and regulations, including contacting State Historic Preservation Division.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will contain dairy activities and related impacts within the project area. No short-term impacts are anticipated.

Long-term Impacts and Mitigation – Archaeological and Historic Resources

The State Historic Preservation Division accepted the AIS December 19, 2016 (see, FEIS, Appendix G). SHPD concurs with the significance assessments and mitigation recommendations in the AIS, which identifies the 14 plantation-era sites within the project area as significant only under Criterion d (information potential). The letter states no further work is recommended for these sites (50-30-10-2251

through 2262). Two sites outside the Project Area, an enclosure (Site -2250) and a petroglyph complex (Site -3094), were assessed as significant under Criterion d (information potential) and e (cultural value). The SHPD letter states that the current proposed project will not affect these two sites, and no further mitigation is recommended for the project. Future proposed projects outside the current project area shall require consultation with SHPD.

A majority of the identified sites within the project area were associated with Plantation-era sugarcane cultivation, and will not be adversely affected by the proposed project. Most are in fair to good condition. While representing an interesting time period in the history of the Kōloa-Māhā'ulepū area, no further work is recommended as all relevant information has been gathered from these sites. Adaptive re-use is a possibility, such as use of bridges and culverts. No long-term impacts are anticipated, and no further mitigation is recommended for the project area.

Cultural Practices and Historic Resources (page 4-34)

Impacts that would be considered significant related to cultural practices and resources could include:

- Isolation of cultural resources from their setting; and
- Introduction of elements that may alter the setting in which cultural practices take place.

Short-term Impacts and Mitigation – Cultural Practices and Resources

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs. Information received from the community indicates the Māhā'ulepū ahupua'a has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. Gathering of plants and marine resources, and two known State sites are outside the project area: State Site 50-30-10-2250, the agricultural heiau; and State Site 50-30-10-3094, three petroglyph boulders. No significant cultural sites occur within the HDF site.

No change to current cultural practices within the Māhā'ulepū ahupua'a will occur from dairy establishment or operations.

Long-term Impacts and Mitigation – Cultural Practices and Resources

The perception of most community members interviewed was that the dairy may have indirect and direct negative impacts on the environment in the area. The FEIS analyzes potential environmental impacts, which are summarized in the FEIS Section 4.27.

The findings of research related to preparation of the Cultural Impact Assessment for the dairy site, including interviews of community members, states that it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

Flora (page 4-36)

Impacts that could be considered significant related to flora could include:

- Disturbance or displacement of native vegetation and native habitats, or flora with State or Federal status as threatened or endangered; and
- Long-term degradation of native habitat or flora on site as part of on-going dairy operations.

Short-term Impacts and Mitigation – Flora

Native plants with potential to stabilize banks will be encouraged and supplemented if needed to enhance the planned buffer strips along drainages (Section 4.17.2, Surface Water Quality). No threatened or endangered plants occur on the project property. Only 5 of the 115 plant species recorded during the survey were native, and no intact native habitat exists. Construction of the dairy farm is not expected to result in adverse impacts to native plants.

Long-term Impacts and Mitigation – Flora

Vegetated buffer strips along the drainageways are part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Fauna (pages 4-37 through 4-40)

Impacts that would be considered significant related to fauna could include:

- Disturbance or displacement of endangered species habitat during construction; and
- Long-term disruption of fauna on site and nearby as part of on-going dairy operations.

Short-term Impacts and Mitigation – Fauna

There is no critical habitat for endangered species in the upper Māhā'ulepū Valley. Four species of endangered waterbirds have been recorded on or adjacent to the site, though the area does not provide critical habitat. Seabirds that nest in upland areas of Kaua'i may overfly the site; outside lights used at night will utilize shades to protect against uplighting and be dark sky compliant to prevent possible disorientation of the birds.

Short-term impacts for waterbirds and seabirds could be posed by construction activities, such as clearing and grubbing, which have the potential to disturb nesting waterbirds, nests, eggs and young. There also is the potential for interactions between endangered waterbirds and construction equipment, vehicles and construction personnel. Waterbirds disturbed when nesting may abandon their nest, eggs and to a lesser degree chicks. Nēnē nest in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting. Potential impacts to this species are similar to those discussed for waterbirds, though nēnē may utilize areas far from water to nest, if adequate shrubbery exists. Increased vehicular traffic associated with construction activities also increases the risk of birds being run over or hit by vehicles, within the dairy site.

Measures to avoid potential seabird and nēnē collisions with fences and structures include lowering construction cranes at night, using dust shields to protect specified areas, marking tall structures and fencing with white visibility polytape, prohibit nighttime construction, and shading any outside lights used at night.

HDF has been coordinating with the U.S. Fish and Wildlife Service (USFWS) and the State Department of Land and Natural Resource Division of Forestry and Wildlife (DOFAW) to specify management actions related to both construction and dairy operation to prevent impacts to any endangered species potentially present within the project area. An initial draft of the Endangered Species Awareness and Protection Plan (ESAPP) is attached to this EIS as Appendix L. The ESAPP will be refined in coordination with USFWS and

DOFAW, and will be finalized prior to construction of the dairy and implemented throughout start-up and during on-going dairy operations. Key components of the ESAPP are listed below.

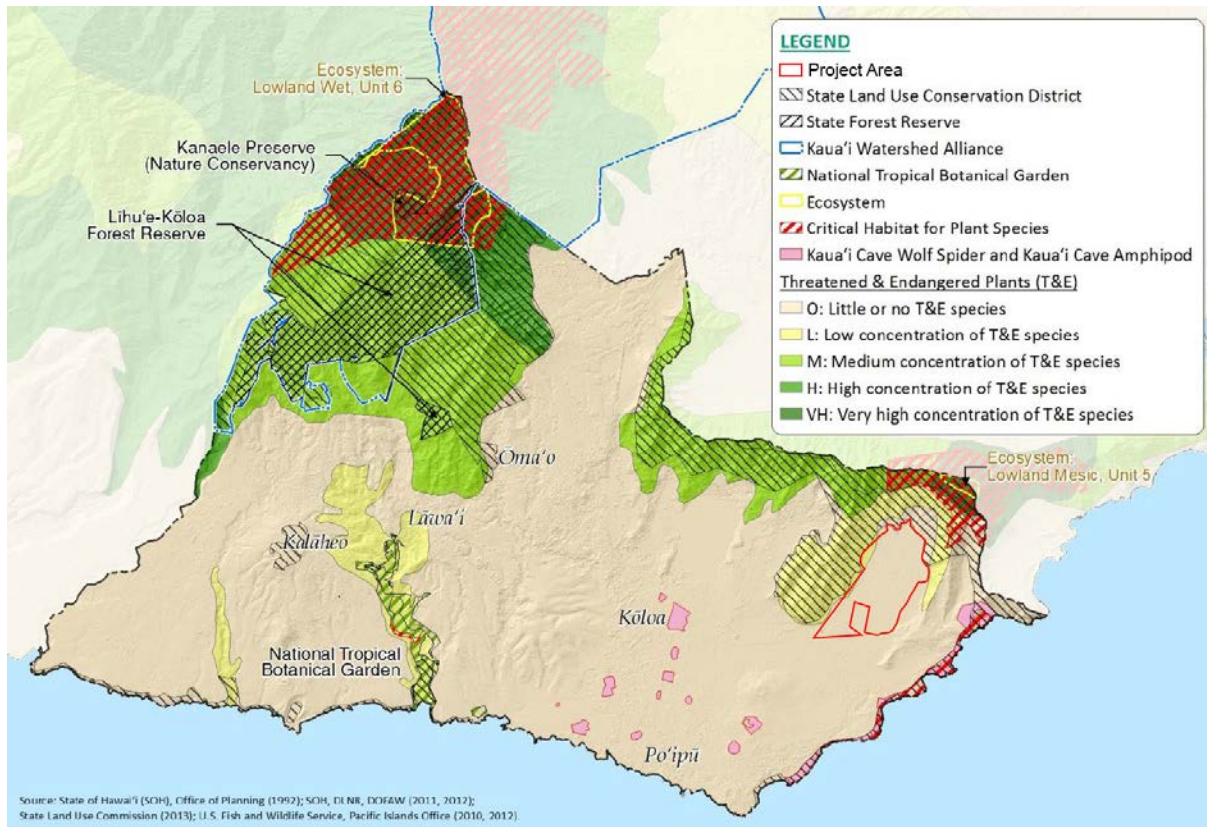


Figure 4.9-1 Critical Habitats, Reserves, State Conservation Districts, and Ecosystems

Modified from: South Kaua'i Community Plan, 2015

During the construction phase and throughout day-to-day operation of the dairy farm, the following measures and training will be utilized to ensure that construction activities do not result in deleterious impacts to the endangered species that may be encountered during construction.

- Develop an endangered species awareness training module
- Provide endangered species awareness training to construction and other workers prior to starting work
- Prepare Endangered Species Identification references with photographs, description of habits, and likely areas on the property where they are most likely to occur and/or to nest
- Have a qualified biologist act as a monitor to survey for nesting waterbirds and nēnē immediately prior to construction activities. Construction activity will be halted if nesting activity is identified within 100 feet of construction until nesting activity ends. Alternately, the biological monitor will consult with State or Federal wildlife regulators to determine the best course of action
- Post 15 mile per hour speed limit signs and enforce on all roads within the project
- No pets allowed on property – especially dogs and cats
- Provide closed trash receptacles for all personnel and visitor food and provide for disposal
- Enforce no feeding of any birds
- Designate construction personnel parking areas
- Survey and delineate construction materials and equipment parking and maintenance areas
- Include the above as contract provisions and in construction best management practices
- No nighttime construction activity will be conducted. Any equipment maintenance required at night during the construction phases of the dairy farm will utilize 100 percent cutoff, fully shielded luminaires and be mounted high enough off the ground to be directed perpendicular to the ground.
- All outdoor lights installed as part of the project will be shielded to reduce the potential for interactions of nocturnally flying seabirds with external lights and man-made structures
- Construct fences without barbed wire.
- Maintain traps with or without baits to capture feral cats or rats that may harm waterbirds or nēnē transiting or using the HDF site, as agreed to during coordination with the USFWS and DOFAW.

Long-term Impacts and Mitigation – Fauna

The impacts described for the dairy construction period for the four waterbird species, nēnē and seabirds potentially overflying the area would be similar for long-term dairy operations. Additionally, operation of the dairy may attract higher densities of mammalian predators such as cats, dogs and rats. On many dairy farms the increased number of rodents drawn to feed, silage and waste treatment areas is usually alleviated by encouraging cats within the facility to assist in the control of rodents. The increase in either or both of these predators would pose heightened risks to nesting nēnē and protected waterbirds, nests, eggs and their young. A predator control program will be implemented to bait and trap for rodents. Control of other mammalian predators will be adaptive and responsive to changing patterns of activity.

It is likely that Hawaiian hoary bats overfly the project area on a seasonal basis. The principal potential impact that the development of the proposed dairy farms poses to bats is during the clearing and grubbing phases of construction as vegetation is removed. The removal of vegetation within the project site may temporarily displace individual bats, which may use the vegetation as a roosting location. There are very

few mature trees on the dairy farm site, which is the habitat preferred by hoary bats as roosting locations. As bats use multiple roosts within their home territories, the potential disturbance resulting from the removal of the vegetation is likely to be minimal. During the pupping season (June to September), females carrying their pups may be less able to rapidly vacate a roost site as the vegetation is cleared. Additionally, adult female bats sometimes leave their pups in the roost tree while they forage.

While there are almost no suitable roost trees within the dairy site, HDF will not disturb, remove or trim woody plants greater than 15 feet tall during the Hawaiian hoary bat pupping season. No effect to bats is expected from activities and operations of the dairy farm.

Prior to build-out and the start of Dairy operations, the following mitigation strategies will be implemented:

- Develop an Endangered Species Awareness and Protection Plan (ESAPP) in coordination with the USFWS and DOFAW. The draft ESAPP attached as Appendix L provides more detail and the rationale for best management practices to ensure that dairy operations would not result in deleterious impacts to protected wildlife. The ESAPP will be finalized to also include these additional topics:
 - Endangered Species Identification references with photographs, description of habits, and areas on the property where they are most likely to occur and/or to nest
 - Employee endangered species training, provided both in writing and as a PowerPoint presentation for use in training new personnel and annual updates of training
 - Predator control program
 - Downed seabird, and injured waterbird response protocols

Invertebrates (pages 4-43 through 4-45)

Impacts that would be considered significant related to invertebrate insects and pest species could include:

- Disturbance or displacement of protected or endangered insects; and
- Inadvertent introduction of non-native species not known to Hawai'i, or an increase in pest populations.

Short-term Impacts and Mitigation – Invertebrate Species and Pest Insects

There are no native, protected or endangered insect species within the HDF site. Construction will not impact any endangered invertebrate populations. It is possible that flies known from elsewhere on the island, associated with areas containing high pet populations, could be inadvertently transferred the HDF site and possibly utilize cow manure as a food source.

To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, contained and disposed of in order to limit possible breeding habitat for flies. Inspections of building materials for ants or other insects will be conducted to prevent introduction of new pests to the HDF site.

Long-term management for pests (explained in the following) relies on a natural food web cycle that will expand as the habitat (manure) is increased. In the short-term, supplemental pest control using mechanical and chemical methods may be used to prevent any spike in pest populations. Mechanical methods include sticky tapes or ribbons that could be used in the milking parlor or covered areas of the dairy facility. Traps will be used as needed for both monitoring and removal of flies. Traps can use attractants or not; versions designed for use outdoors could be used in paddocks from which cows are excluded (those not being actively grazed). Chemical methods may be used to prevent short-term spikes in pest populations. Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Such control would only be used when needed by those qualified to apply chemicals, and in accordance with authorized procedures and regulatory labeling requirements.

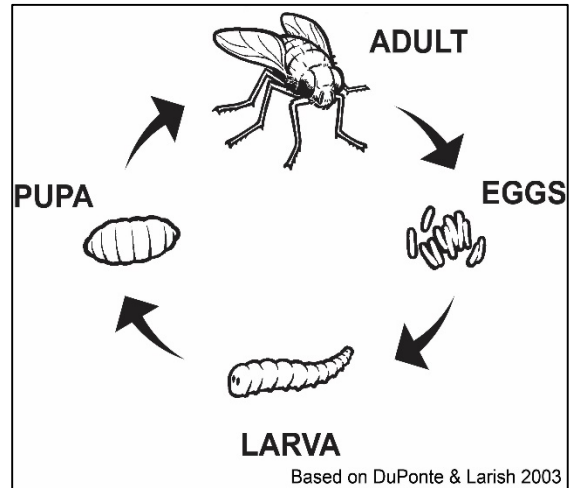


Figure 4.11-2 Egg to Fly Lifecycle

Long-term Impacts and Mitigation – Invertebrate Species and Pest Insects

Integrated pest management utilizes knowledge of the ancient food web among species. Disrupting reproduction of potential pests with appropriate means at key points in the life cycle has been used in Hawai'i for decades (Figure 4.11-2). Extensive introduction of dung beetle species between 1898 and 1985 in response to cattle-related insect pests resulted in 14 dung beetle species becoming established on Kaua'i. Cattle egrets, a bird species introduced to Hawai'i in the late 1950s to control cattle-associated insects, break up dung patties while searching for prey (Figure 4.11-3).

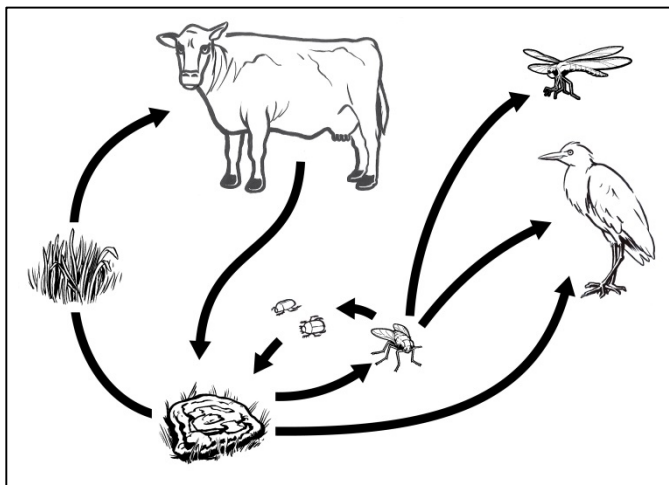


Figure 4.11-3 Manure-Related Food Web

Dung beetles speed incorporation of the manure into the soil by breaking up bovine manure pats and transporting the organic material into the soil. A healthy population of dung beetles can bury a dung pat in one to three days. Breaking up and burying the dung patty destroys the habitat for insects such as flies to complete their life cycle. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupa) to survive. The house fly takes 7 to 10 days from egg to fly, and can use a number of damp, decaying material as habitat. The horn fly takes 10 to 20 days from egg to adult.

The behavioral diversity among dung beetle species working together can bury dung patties in one to three days. Some beetle species fly at night and some during the day; some prefer older manure over fresh. HDF and other ranchers on Kaua'i may choose to engage with the State Department of Agriculture to translocate dung beetle species already introduced

on Kaua'i or in the state to Māhā'ulepū and other areas if manure-related flies become a problem (Figure 4.11-2).

HDF will not maintain any populations of dogs, cats or chickens at the dairy, and will discourage feral pigs and the island's wild jungle fowl. These domesticated or feral animal populations could provide dung that facilitates breeding of several species of flies not currently established on site. Proper disposal of dog and cat feces is important. Chicken feces can accumulate in sufficient amount to provide a location for fly breeding. While feral chickens are common throughout Kaua'i, HDF will diligently clean any spilled feed or other potential attractants to keep chickens away from the dairy facility as well as rats.

Good housekeeping is an important tool in controlling establishment of most flies. Human food waste from on-site workers' meals would be disposed of in a covered, lined container and removed from the site often. Any spilled or waste supplement foods for the cattle should not be allowed to become wet and stay exposed. Rotting food waste can provide attractive habitat for fly breeding, therefore food waste will be disposed of properly. HDF personnel will be alert for bags along the roads around the property and remove them if practical. If left, the trash bags could breed flies that would then migrate to the nearest habitat of interest – the cattle manure.

Neighboring farms must also maintain the health of its sheep, as cows and sheep can share health issues. Of special concern should be the sheep bot fly (*Oestrus ovis*) that rarely can pass to cattle. This pest attacks by laying eggs that produce maggots in eyes and nasal passages.

Bees are an essential part of any agricultural ecosystem. It is expected that honey bees will visit water sources set up for the HDF herd. A 'ramp' will be built into any open water source to allow bees some chance of swimming to an escape rather than drowning. A struggling bee, floating in the tank, lapped up by a drinking cow could sting by reflex. A scoop or sieve will be used to remove bees before stock access the drinking area. The bees should be disposed of safely as the stingers of even a dead bee will function if pressure is exerted. Also, safe application practices for any unavoidable herbicide or pesticide will be utilized to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself, a local beekeeper will be contacted for advice and removal.

Livestock water troughs will contain water for the period of 12 to 24 hours when cows occupy the paddocks. HDF personnel will fill troughs just before the cow "mobs" enter the paddock(s) for the grazing period; troughs will be emptied after the cows are moved to another paddock. Thus troughs will be managed to prevent mosquito breeding.

Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area in the near surrounds of the HDF site. Thus no cave invertebrate species will be affected by the dairy farm. The known caves in the vicinity are approximately 0.75 mile from the closest point to the dairy farm, with no reported connection to the dairy farm site. The majority of critical habitat for the endangered cave spider and amphipod is in the Kōloa region several miles away. Integrated pest management measures employed to reduce cattle-associated pest fly species at this site will not affect native flies (*Drosophila*), as the habitat for this species is high elevation koa-ōhi'a forests located miles away.

The dairy operation is not expected to impact any endangered invertebrate populations. HDF will minimize populations of any pest insects such as flies, which already exist on the island of Kaua'i.

Noises (page 4-46)

Impacts that would be considered significant related to noise could include:

- Increased noise levels during construction; and
- Noise levels that interfere with human activities at home, work or in schools, or that is injurious to people's health and well-being.

Short-term Impacts and Mitigation – Noise

Construction work at the project site will involve activities that may generate an increase in noise levels. Noise related to construction will be a short-term condition, occurring during daylight hours.

Construction vehicles and activities must comply with HAR §11-46. A permit is required for construction activities that emit noise in excess of 78 decibels or that cost a total of more than \$250,000 (based on the value on the building permit).

Construction noise is anticipated to be short-term, and will be minimized through application of best management practices to include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

Long-term Impacts and Mitigation – Noise

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Equipment will typically be used during daylight hours. Dairy operations will comply with applicable noise control ordinances. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Maximum permissible sound levels apply to any point at or beyond the property line, and are not to be exceeded more than 10 percent of the time within any 20-minute period.

Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

Hazardous Substances (pages 4-47 through 4-49)

Impacts that would be considered significant related to hazardous substances could include:

- Production or run-off of hazardous substances during construction; and
- Long-term purposeful or inadvertent introduction or seepage of hazardous substances to soils or waters from on-going dairy operations.

Short-term Impacts and Mitigation – Hazardous Substances

Construction equipment operations at the dairy farm will involve the use of fuels and lubricants. Construction operators will conduct operations in compliance with State and Federal laws to properly manage the use and storage of fuels, lubricants and cleaning to avoid the release of hazardous materials.

Long-term Impacts and Mitigation – Hazardous Substances

Establishment of pasture and on-going cultivation of the robust grass that will provide dairy cows with the majority of their food source will include use of commercial fertilizer to support sufficient grass yields. Herbicides will be used judiciously where needed to control pasture weeds. Flies inhibit productivity on a dairy farm. An integrated pest management program will be employed, with primary control focused on eliminating breeding sites and maintaining a natural predator-prey cycle among invertebrates. Pesticides may be used to prevent short-term spikes in insect pest population (see Section 4.11, Invertebrate Species and Pest Insects).

Healthy cows are a priority for HDF, and antibiotics as prescribed by a licensed veterinarian may be used from time to time, to ensure cows remain healthy and are treated humanely. Guidelines set by Food and Drug Administration (FDA) will be followed to avoid any antibiotic adulteration of milk. Additionally, HDF will routinely conduct laboratory tests on milk for any trace of antibiotic residue. HDF will not treat cows with sub-therapeutic, preventative, or growth promoting use of antibiotics, ionophores or hormones (such as rBST).

Equipment operations at the dairy farm require fuels and lubricants. An emergency power generator with associated fuel storage will be available to power the milking parlor and other critical operations in the event of an electrical outage. Off-road diesel fuel and unleaded gasoline for use in farm vehicles will be stored in two above-ground exterior tanks. Hydraulic fluid and motor oil, to be delivered from a local fuel supplier, will be retained in 55-gallon drums. Brake and transmission fluids and all-purpose grease, will be maintained in the original containers. All containers and drums will be stored within appropriately designed secondary containment areas.

Pesticides, herbicides, fuels and lubricants will be stored according to regulations. Products will be locked within the implement shed when not in use, and segregated by type and per regulations. Fertilizers will be stored in original packaging as delivered by the supplier. Herbicides, pesticides and veterinarian-prescribed medicines will be stored in a separate, locked area under the direct control of the dairy manager or delegate.

The Emergency Planning and Community Right-to-Know Act (EPCRA) under the Environmental Protection Agency (EPA) regulation 40 CFR Part 355 (2008) requires information regarding the existence of chemicals at individual facilities, and any hazardous releases. The regulation informs emergency planning and increases the public's knowledge of facilities in their communities. Under EPCRA, for dairies with 700 or more mature dairy cows, releases of ammonia or hydrogen sulfide emissions in excess of 100 pounds per day must be reported. Animals that reside primarily outside of an enclosed structure and graze on pasture are not counted toward the threshold, and any emissions from the waste while not stabled or confined are not counted towards the reportable quantity unless the waste is consolidated into a storage unit (40 CFR Part 355.31, 2008).

For the committed herd size of up to 699 mature dairy cows, the regulation does not apply. Total potential emissions of ammonia and hydrogen sulfide were calculated for the contemplated herd size of up to 2,000 mature dairy cows to determine the potential for releases and reporting under EPCRA. Average daily ammonia and hydrogen sulfide emissions related to manure routed to the effluent ponds from the milking parlor and holding yard are estimated to be 39 pounds per day of ammonia, and 9 pounds per day of hydrogen sulfide. Emissions from effluent application from the ponds to the pastures are calculated at 48

pounds per day for ammonia, and zero for hydrogen sulfide (Arcadis, unpublished). The threshold of 100 pounds per day of either ammonia or hydrogen sulfide will not occur at the contemplated herd size of up to 2,000 mature dairy cows, and HDF operations will not fall under the EPCRA reporting requirement.

No significant long-term impacts will occur from hazardous substances related to dairy operations, due to minimization of risk, secondary containment, and compliance with best management practices.

Demographic and Economic Conditions (pages 4-53 through 4-54)

Impacts that would be considered significant related to demographic and economic conditions could include:

- Impact of construction labor and materials on local economy and businesses; and
- Long-term impacts from the dairy operation on nearby property values and the agricultural industry locally and Statewide.

Short-term Impacts and Mitigation – Demographic and Economic Conditions (Page 4-53)

The Hawai'i Dairy Farms project would create short-term benefits through jobs for local construction personnel and local material suppliers. Construction employment would be expected to average about 12 jobs per year during the development period. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i, and 8 on O'ahu. Thus direct-plus-indirect employment associated with Dairy development would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i (PEP, 2016).

Construction of the facilities at HDF would contribute approximately \$9.1 million per year during the development phase. This includes direct equipment and construction expenditures, and indirect sales related to construction.

In addition to the creation of an average of 12 construction worker jobs during the estimated construction period, the State of Hawai'i and County of Kaua'i will receive excise tax revenues on finished development and building materials, conveyance taxes, and income taxes on wages. Revenues from development activities to the State is estimated at \$650,000, with revenue offset by a tax credit for improvements on lands designated IAL. County revenue derived from development will be negligible.

Long-term Impacts and Mitigation – Demographic and Economic Conditions (Page 4-53)

Hawai'i Dairy Farms would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Big Island), less than 10 percent of Hawai'i's milk is locally supplied. The Hawai'i Dairy Farms project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.5 million gallons of milk annually, a 50 percent increase in statewide milk production. Once the facility is established and dairy operations have reached the committed herd size, approximately 11 direct and indirect full-time equivalent jobs would be sustained on Kaua'i, including 5 farm jobs and about 6 indirect jobs. An additional 3 indirect jobs would be created on O'ahu. For the contemplated herd size direct and indirect employment will roughly double.

Once fully operational with a herd of 699 mature dairy cows, annual direct-plus-indirect sales are estimated annually at \$8.1 million on Kaua'i, with an additional \$2 million on O'ahu.

When the dairy has matured to full production for the 699-cow dairy, net income to the State is calculated to exceed \$60,000 annually. Net income to the County from HDF is anticipated to generate \$51,000 (PEP, 2016). Employment and sales and tax revenue for the contemplated herd size of up to 2,000 mature dairy cows is discussed in Section 4.21.

Results of the technical study on economic impacts included an evaluation of property values adjacent to grazed areas within Kōloa and Po'ipū. For new, larger homes being built adjacent to grazing lands in developments with amenities, the 2016 median assessed values ranges from \$1,297,150 for a lot, to \$2,893,100 for a lot with home. Clearly, beef cattle operations are compatible with nearby homes, commercial areas, resorts and recreational areas. Although stocking densities are lower for beef cattle on unirrigated pastures than they are for the proposed dairy on irrigated pastures, the operations are similar: cattle are rotated among pastures as limited by the carrying capacity of the land.

Results of technical studies and the findings of the EIS show no unmitigated nuisances that would affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will reach resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area. The dairy will help maintain the existing rural character and ambience of the Kōloa-Po'ipū region. (PEP, 2016).

Ground Water (pages 4-62 through 4-64)

Impacts that would be considered significant related to groundwater supply and groundwater quality could include:

- Depleting the groundwater supply or interfering with groundwater recharge for aquifers in the project area; and
- Degradation of groundwater quality below State or Federal standards.

Short-term Impacts and Mitigation – Groundwater Resources

Water supply required for construction is anticipated to be nominal in comparison to previous agricultural water demand. The major water demand during construction will be for fugitive dust control in compliance with Hawai'i Air Quality rules (see FEIS, Section 4.19). Water will come from a non-municipal source: either the on-site deep wells; or from the HDF allocation of water from Waita Reservoir (see following Section 4.17, Surface Water).

Construction of Hawai'i Dairy Farms facilities is not anticipated to deplete the groundwater source or interfere with groundwater recharge in the short-term. There will be no significant effect on the groundwater supply in the short-term.

Long-term Impacts and Mitigation – Groundwater Resources

Long-term groundwater supply impacts are not anticipated to be significant. Total potable water demand is approximately 30,000 gpd (0.03 MGD) for the committed proposed action herd size of up to 699 mature dairy cows (FEIS, Table 4.16-2). Groundwater use for the contemplated herd size of up to 2,000 mature dairy cows is shown in the FEIS at Section 4.22, Table 4.22-1. The demand of approximately 30,000 gallons

per day (0.03 MGD) the committed herd size is a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era (TNWRE, 2016). The sustainable yield of the larger 51-square mile Kōloa Aquifer System is 30 MGD (CWRM, 2008).

Surface Water (pages 4-70 through 4-73)

Impacts that would be considered significant related to surface water could include:

- Cows depositing manure into on-site surface water and damaging the banks of the drainageway causing erosion;
- Introducing sedimentation into the on-site drainage ways; and
- Stormwater run-off carrying manure or nutrients into surface waters.

The probable impacts to surface waters and the nearshore marine environment are discussed in this section. The *Surface Water Quality and Marine Assessment* report prepared by MRCI includes an analysis of potential impacts from dairy operations, including nutrient run-off from the dairy site. Proposed minimization and mitigation measures to reduce HDF impacts to surface waters and the nearshore marine environment are included.

Short-term Impacts and Mitigation Measures – Surface Water Resources & Marine Environment

As discussed in the FEIS, Chapter 3.0, Description of the Proposed Action and Section 4.2, Topography, there will be site work required for pasture establishment and dairy facilities development. These developments will be designed to employ NRCS standards per the HDF Conservation Plan. Best management practices will be utilized during construction and pasture establishment.

A Stormwater Pollution Prevention Plan (SWPPP) has been developed for the site to document controls and best management practices to avoid, control, and trap potential erosion associated with construction activities. The SWPPP is required as part of the application for the NPDES – Construction Storm water General Permit, and describes any discharge in compliance with relevant regulations.

In compliance with Federal and State Clean Water regulations, HDF will institute appropriate controls and procedures to retain storm water impacted by construction, and to prevent hazardous materials such as petroleum products from construction vehicles from coming into contact with storm water run-off. Both management controls and structural controls will be implemented in the short-term. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; prohibiting leaking or poorly-maintained construction equipment and machinery; and keeping adjacent public, paved streets free of dirt and mud. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Short-term adverse impacts to surface waters from construction are anticipated to be within NPDES permitted levels. No short-term adverse effects are anticipated to the quality of nearshore ocean waters and the nearshore marine environment.

Long-term Impacts and Mitigation Measures – Surface Water Resources & Marine Environment

Long-term impacts will improve surface water quality in agricultural ditches and the downstream Waiopili Ditch.

Soil Erosion and Suspended Sediments. Over the long-term, the surface water quality in the intermittently flowing agricultural ditches and Waiopili Ditch will be improved by active management of the dairy site. Cultivation of a grass thatch for complete vegetative cover throughout the dairy paddocks will minimize currently exposed soils within the site. The reduction in runoff from various storm events was estimated where flows combine in Māhā'ulepū Ditch immediately south of the project site. For the 10-year storm event, peak flow leaving the project site will be reduced by 257 cubic feet per second (cfs); for the 25-year storm event, reduced by 283 cfs; and for the 50-year storm event, reduced by nearly 300 cfs (Section 3.3.2.3).

Vegetation and stream flow in the areas downstream of the dairy site are beyond the control of the dairy operation. Mahaulepu Farm's agricultural tenants have responsibilities to maintain farm lands and vegetation growth along ditches to allow channel flow during peak stormwater runoff events. Suspended soil inputs from natural sources and offsite ranching and agricultural uses in the watershed will continue to enter the agricultural ditches, which drain downstream into Waiopili Ditch and the nearshore ocean waters.

Waiopili Ditch receives runoff from the larger 2,700-acre Māhā'ulepū Valley sub-watershed, including the lands mauka and makai of the dairy facilities and pasture paddocks. The dairy site represents roughly 20 percent of the sub-watershed, and soil erosion within the dairy will be reduced by establishment of the thick grass ground cover for pasture and filter strips along drainageways (Section 4.3.2, Soils).

Nutrients from Effluent Irrigation and Commercial Fertilizer Application (page 4-71). The Conservation Plan and best management practices include setbacks to minimize impacts to waterways. For effluent application, the setback is 50 feet from drainageways. Irrigation and nutrient application will maintain sufficient pasture grazing grasses for the herd. Non-potable irrigation water from Waita Reservoir will be applied through the central pivot system, and can be mixed with nutrient-enriched water from the effluent ponds as fertilizer. Refer to Section 3.5.3 and Appendix D, Nutrient Balance Analysis (Group 70 and Red Barn, 2016).

The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows. Therefore, supplemental commercial fertilizer will be required to provide sufficient nutrients to sustain the pasture grass at the committed herd size. In keeping with the NRCS Nutrient Management Practice Code, monitoring and analysis of soil, manure, and tissue samples will be used to amend the nutrient budget analysis prepared for the site (Appendix D).

Surface water is estimated to carry three times more nutrients than groundwater moving through the alluvium on the valley floor (see previous discussion, Groundwater). The groundwater and surface water analysis (Appendix E) estimates two percent of total nitrogen and one percent of phosphorus could potentially leave the site. Given the poor permeability of the alluvium, groundwater flow would be modest. However, the groundwater level in the alluvium is approximately 80 feet above mean sea level near the HDF monitoring wells 1 and 2, and lie approximately 8 to 10 feet deep. The groundwater can rise in wetter periods and intersect the deep drainage ditches. Episodic, seasonal events will result in a modest amount of discharge from groundwater into the surface channel.

Using NRCS curve number method to compute runoff for the sites' B and D class soils and irrigated pasture in good condition, it is estimated that actual runoff into drainage ways from HDF pasture will only occur

when rainfall exceeds 0.8 inches. Based on the 30-year daily rainfall record for the area, such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Applying the estimates of two percent and one percent of nutrients to the HDF operational nutrient mass balance, two percent of nitrogen would total 10,000 pounds per year, and one percent of phosphorus would total 900 pounds per year leaving the site through periodic run-off to drainage ways or percolation through soil. Note that nutrient release from the dairy site would not occur as chronic daily release, rather, the contributions would be limited to periods of the major rainfall and storm water events. Per best practices, no effluent application would be conducted two days prior to, during, and two days after such weather events. The estimate of nutrients leaving the site from either groundwater or surface water is the same for both the committed herd size of 699 mature dairy cows and the contemplated herd size of up to 2,000 mature dairy cows.

FEIS, Section 4.20.1, Interrelationships and Cumulative Environmental Impacts, compares the nutrient input from the adjacent Kōloa-Po'ipū region. Nitrogen additions to the near-term marine environment along the Po'ipū coastline are estimated at 38,510 pounds per year from domestic wastewater and landscape fertilization, equating to 3.5 times greater than the potential contribution from HDF; phosphorus of 1,260 pounds per year is calculated and is 1.4 times greater than the potential contribution from HDF.

Nutrients from Manure in Pastures (page 4-72). Utilizing nutrients from the manure's organic matter is key to the pasture-based rotational grazing system. As described in Section 4.3, Soils, microbes within the soils effectively transport nutrients from manure and effluent to plants. Cow manure deposited in the pastures will break down naturally into organic matter and release nutrients in the process. The soluble nutrients from the manure will enter the pasture grass, underlying thatch and soil profile, and be utilized as part of the nutrient requirement of pasture grasses.

NRCS Practice Standards and the DOH *Guidelines for Livestock Management* (2010) have established various setbacks to minimize impacts to waterways. Fences will be erected along 35-foot setbacks to exclude cows from drainageways. The 35-foot setbacks (totaling 70 feet, as setbacks are on both sides of the drainageways) will be vegetated to act as filter strips and trap soil particles and organic debris from stormwater runoff. Manure particles that do not settle out in to the buffer area could be carried into ditch waters and downstream with stormwater flows. During runoff events, ditch waters will also contain substantial organic debris, suspended sediment and nutrients from natural and other man-made sources in the watershed. The relative contribution of manure particles in the stormwater flows within agricultural ditches will be a small fraction of the total from the watershed.

Impacts to the Nearshore Marine Environment (Page 4-72). During the rainfall and runoff events, the dairy's nutrient contributions would be further diluted by additional volume of surface runoff and ditch flows. The terminus of Waiopili Ditch is a deep, muddy basin that joins the ocean through a channel cut through beach sand. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. MRCI concluded there will be no substantial effects to marine water quality from the HDF dairy (Appendix F).

Based on results of the marine biotic survey and considering the response of other marine habitats throughout Hawai'i to nutrient inputs, there is no indication of any conditions associated with potential discharge from HDF that could lead to deleterious effects to coral reef communities (FEIS, Appendix F).

Mitigation –Buffers (Page 4-73). Vegetative buffers totaling 70 feet in width – 35 feet on either side measured from the top of the agricultural ditches – will be established in keeping with the *Guidelines for Livestock Management* (DOH, 2010) to improve and maintain water quality and reduce erosion. Fences will be erected along the 35-foot setbacks to exclude cows from the buffer areas; vegetation along the buffer will trap soil particles and organic debris in order to minimize inputs to storm water runoff. Vegetation in and adjacent to the ditches will be maintained to control overgrowth and minimize ditch bank soil erosion.

Additional effluent application setbacks totaling 100 feet in width – 50 feet from the top of either side of a waterway – will keep nutrient applications away from waterways.

Mitigation - Surface Water Quality Monitoring (Page 4-73). A long-term water quality monitoring program has been instituted to regularly sample and analyze nutrient and chemical constituent levels of the surface waters (agricultural ditches and Waiopili Ditch). The monitoring program and methods will be established to meet the Department of Health’s Clean Water Branch quality assurance/quality control requirements. The ongoing testing program will provide feedback to the dairy management team regarding changes in water quality. Data from the surface water monitoring program will be made available to the DOH CWB, dairy neighbors and the local Kaua’i community.

Increases in nutrients as a result of dairy establishment or operations can inform modification of the operation’s nutrient management. Modifications to the timing and placement of effluent can be made; the rate of application can be changed; different crops can be utilized to increase uptake by plants; and the number of cows can be changed. Nutrient management is a dynamic process that is informed by monitoring a number of parameters; the ability to monitor nearby water bodies for changes in nutrients is an additional check that provides data to be publically shared.

Mitigation - Ocean Water Quality Monitoring (Page 4-73). A long-term ocean water quality monitoring has been instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze nutrient and chemical constituent levels in the nearshore marine waters. The ongoing testing program will provide feedback to the dairy management team regarding changes in water quality. Data from the nearshore water monitoring program will be made available to the DOH CWB, dairy neighbors and the local Kaua’i community.

Roadways and Traffic (pages 4-74 through 4-76)

Impacts that would be considered significant related to traffic could include:

- A significant increase in traffic on Ala Kinoiki or Po’ipū roads; significant traffic delays for a substantial number of motorists; or
- Changes to traffic patterns or road infrastructure that affect pedestrian, bicyclist or motorist safety.

Short-term Impacts and Mitigation Measures – Roadways and Traffic

The proposed project is not expected to significantly increase traffic in the project vicinity in the short-term. The construction-related traffic will end after project completion.

There will be no significant change to traffic patterns or infrastructure related to the public roads.

Long-term Impacts and Mitigation Measures – Roadways and Traffic

Traffic operations along Māhā‘ulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic for the long-term. The projected increase in vehicle movements related to HDF operations is shown in Table 4.18-1, and includes daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

There will be no significant change to traffic patterns or infrastructure related to the public roads. Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

The potential traffic impact based on the contemplated herd size is discussed in Section 4.24.

Air Quality and Odors (pages 4-81 through 4-82)

Odor isopleths (a line used to map all points having the same numerical value) were created using the results of AERMOD computer modeling that utilized four types of input data: emission source information, receptor locations, meteorology, and model specific control options (site and project specific data options).

Short-term Impacts and Mitigation – Odor

As the herd is established at HDF, odor will be below the modeled quantity as fewer animals will be on site. In the short-term, there will be no odor impacts.

Long-term Impacts and Mitigation – Odor

Unlike a conventional feedlot dairy facility, the majority of manure will be deposited directly on the pasture where it will break down and be incorporated into the soil within a one- to three-day period. Manure collected from barns and paved areas will be washed into a settling pond for re-use on the pastures. Manure is cycled through the ponds on a regular basis guided by irrigation needs; over a period of roughly 45 days, effluent is completely utilized and replaced.

FEIS, Figure 4-19.1 displays results of modeling the annual extent of the 6.5 OU/m³ odor level for the herd size of 699 mature dairy cows, with irrigation effluent at two dilutions. For typical precipitation conditions, the effluent concentration will be approximately 4 percent; in unusually wet periods with more precipitation, the effluent concentration could approach 50 percent. The colored area depicts the 99.5th percentile threshold of 6.5 OU/m³. Within the detection area odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year. For the typical conditions, the odor isopleth does not extend beyond the dairy farm boundary more than approximately 1,200-feet (within one-quarter of a mile), and does not reach recreational or residential areas. For wet periods, odor could extend approximately 2,151 feet (less than one-half of a mile) beyond the southern boundary.

Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site. It is important to understand that the isopleths for irrigation effluent represent periods of no winds, during which odor may not be dispersed creating the “worst case” scenario. It should be noted that the

parameters used in the odor assessment were intentionally very conservative and the impacts shown depend on an unlikely confluence of most impactful emission source locations; thus, actual offsite odor impacts are likely to be much lower and/or less frequent than displayed.

The potential odor from slurry application (to be conducted approximately every 45 days), is shown in Figure 4.19-2. To minimize potential odor impacts from slurry used as pasture nutrients, HDF has elected to restrict slurry application to periods when wind speeds are between 9 and 20 mph. With application at the most impactful location, paddocks south of the taro farm, the odor from slurry application barely crosses the southern boundary. Due to wind speeds within this range occurring on average 243 days of the year, the 99.5th percentile is reduced to potentially perceiving the odor just 29 hours per year (Arcadis, 2016b).

Windbreaks, also known as shelterbelts, are used for a variety of purposes including reduction and interception of airborne odors. As a best management practice, *Casuarina cunninghamiana* will be planted along the east south-east boundary of the dairy site. Locally known as ironwood, this tree was introduced to Hawai'i from its native Australia in the late 1800s.

Greenhouse Gases (page 4-85)

The EPA issued the *Final Mandatory Reporting of Greenhouse Gases Rule* (GHG Reporting Rule), which became effective on January 1, 2010. The GHG Reporting Rule requires annual reporting of GHG emissions from large sources in the United States, including suppliers of fossil fuels or industrial GHGs; manufacturers of vehicles and engines; and facilities that emit greater than 25,000 metric tons per year (mtpy) each of CO₂ and other GHGs. Permits and reporting for the stationary source emitters with the potential to emit 25,000 metric tons per year or greater of GHGs are required under the Clean Air Act. Small businesses and farms are not included or required to report.

Short-term Impacts and Mitigation – Greenhouse Gases

Short-term impacts that could contribute to greenhouse gases are those identified related to construction in the FEIS, Section 4.19.1, Air Quality. Mitigation measures to reduce emissions are outlined in the Air Quality section. Contributions to GHG from implementation of the dairy over the short-term will not be significant.

Long-term Impacts and Mitigation – Greenhouse Gases

Long-term operational impacts were modeled using the IPCC guidelines and conversions, and estimated the emissions potential for GHG at the dairy at the committed herd size of 699 mature dairy cows to be 2,693 CO₂e metric tons per year (2,969 US tons). This is equivalent to the GHG generated by 170 4-person households, including home energy consumption, transportation and waste.

(<https://www3.epa.gov/carbon-footprint-calculator>).

Operational practices to protect air quality by reducing nitrogen emissions will come from guidance in NRCS Conservation Practice Standard 590, Nutrient Management. Application of nutrients must be adjusted to minimize negative impacts of GHG release to the environment through adjustments to the source, timing, amounts, and placement of nutrients. Specific practices to be utilized at HDF include: slow release fertilizers; nutrient enhancement technologies; and stabilized nitrogen fertilizers.

To reduce use of fossil fuels at the dairy, HDF will install solar photovoltaic power generation to provide onsite power. A roof-top mounted system using solar panels will be designed to produce 500 kilowatt hours.

While the presence of cows may increase GHG, a long-term beneficial impact of the grazing fields is the sequestration of carbon as CO₂ captured by the process of from photosynthesis by the grass. According to recent studies in the Soil Science Society of America Journal, converting formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, which enhances soil quality, grass production, and has the potential to offset up to one-third the annual increase in CO₂ production of an area.

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ATTACHMENT 2

**MALAMA MĀHĀ'ULEPŪ COMMENT LETTER TO THE DEPARTMENT OF HEALTH
AND GROUP 70 INTERNATIONAL, DATED JULY 25, 2016**

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Mr. Gordon LaBedz, Chair, Koholā Leo
Hawai'i Dairy Farms Environmental Impact Statement
January 3, 2017
Page 3 of 3

Long-term ocean water quality monitoring has been initiated to provide a baseline for the nearshore ocean waters. HDF will regularly sample and analyze nutrient and chemical constituent levels in the near-shore marine environment. Data from the nearshore water monitoring program will be made available to the DOH CWB, dairy neighbors and the local Kaua'i community, and will allow for evaluation of possible contamination sources.

Your comment, along with this response, will become part of the public record and will be published in the Final EIS. A copy of the Final EIS is included on a compact disc with this letter. When published, the Final EIS will be available on the OEQC website which you can access using the following URL, and search "Hawai'i Dairy Farms": <http://tinyurl.com/OEQCKAUAI>.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.



Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai'i Dairy Farms
Hawai'i State Department of Health,
Environmental Planning Office



July 25, 2016

Laura McIntyre
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Submitted via E-mail to all parties.

**Subject: Consulted Party Comments on Draft Environmental Impact Statement (DEIS) for
Hawaii Dairy Farms' Proposed Dairy Operation**

Dear Ms. McIntyre and Mr. Overton,

On behalf of Malama Maha'ulepu, I would like to thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for Hawaii Dairy Farms' proposed dairy operation.

Objectives:

The DEIS augments the HDF project purpose (to "establish a sustainable, pastoral rotation grazing dairy farm that will increase current local milk production, etc."p.1-3) with eight project objectives and four evaluation criteria.

Purpose #2 states "apply proven, sustainable pastoral rotation grazing system and state-of-the-art technology to reduce reliance on costly imported fertilizer and feed." This model

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of dairy operation may be "proven somewhere in the nation or world." If so, where? Examples of this kind of technological dairying should be cited in the DEIS, especially when the pastoral New Zealand-based model has been proved to be flawed through the country, according to the New Zealand Ministry of Health.

Purpose # 8 is to "protect and enhance the area's natural, cultural, social and economic environment through sound agricultural planning, preservation of open space and sensitive resources, and development of economic benefit. "

Nothing in the DEIS demonstrates how the area's natural and cultural environment will be enhanced by the project.

Overview of the Proposed Project:

The Overview of the Proposed Project (p.1-4) says "possible expansion of the herd up to 2000 mature milking cows, following the proven success of the rotation grazing system for local milk production and better understanding the potential carrying capacity of the pasture." How will the carrying capacity and success of the project be defined and quantified/measured?

The Hydrological Assessment for Pasture Areas (Vol 2. Appendix K, Group 70) states that "HDF management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. " (p, 694-695)

How was this "estimated" capacity derived? In addition, a carrying capacity within the dairy boundary is not the same as carrying capacity of the area's surrounding land and waters. Grass might be growing with adequate yield to feed additional cows, but the nutrient loads in surface waters might be exceeding levels that are benign to marine resources.

Unresolved Issues:

"Resolution of the Dairy Size" must depend on more than grass yield and milk production levels. The DEIS recognizes the prevention of negative environmental impacts such as fly infestations and diminished air quality, including manure and urine smells. These factors have to be included as natural system indicators of the "carrying capacity" of the land.

Groundwater Resources:

The DEIS documents state that there are two distinct bodies of groundwater located under the proposed HDF site. The first is a shallow aquifer residing in the alluvium that fills the valley floor, and the second is a deep aquifer in unweathered volcanic rock. Several tests along with associated analyses were performed to determine that these two groundwater bodies are not hydrologically connected, meaning that water does not move freely from the shallow aquifer to the deep aquifer. Matt Rosener, principal of North Shore Hydrological Services reviewed the

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information presented to reach this determination and concur with the interpretation that the 2 water bodies are separate, and leaching of pollutants to the deep aquifer is not likely due to the presence of low-permeability layers that act as an aquiclude.

The DEIS states that some groundwater discharge to the deep drainage ditches located near monitoring wells HDF-1 and HDF-2 will occur as the water table is relatively close to the water table in this area. The document also states that groundwater discharge to the drainage ditches is not expected in the lower part of the HDF property (near HDF-3 and HDF-4 monitoring wells). It should be noted, however, that during a very wet monitoring period in November 2015 the water level in the HDF-3 well peaked at 56.7 feet (MSL) while the ground elevation at this well site is only 57 feet (MSL), meaning the water table was essentially at the ground surface (i.e. saturation). It is unclear why drainage of groundwater into the ditches running through the lower portion of the HDF site would not occur during these commonly occurring conditions. The proposed pumping rate of approximately 30,000 GPD from the private Well 14 located on the proposed dairy site does not seem problematic as the pump was producing up to 3 MGD before the Koloa Sugar Mill closed, effectively ending the sugar plantation era at Maha'ulepu.

Surface Water Resources and Nearshore Marine Environment:

Water quality testing in the area of the proposed HDF dairy showed that agricultural ditches and intermittent streams in this watershed experience chronically degraded conditions for nutrients and pathogens, both pollutants that are associated with animal waste (as well as other sources). The recent DOH Sanitary Survey documented high levels of Enterococcus and Clostridium Perfringens (CP) fecal indicator bacteria (FIB) in Waiopili Ditch sediments. Additional water quality testing for the DEIS performed by Marine Resource Consultants, Inc. (MRCI) showed that FIB counts were generally high at most surface water sampling sites in the watershed but variable between sampling sites and sampling periods. A more detailed water quality evaluation for surface waters in the HDF site area was included in the DEIS in Appendix F. Nothing really stood out in this section other than the general observation that existing surface water quality is obviously already degraded in the Maha'ulepu watershed to an extent and HDF is proposing an intensive land-use on approximately 20% of the watershed area that is already known for its water pollution potential.

Marine water quality testing was also performed by MRCI along several transects extending from the shoreline at Māhā'ulepū to roughly 200 meters offshore. Because water chemistry analyses showed only "small elevations of inorganic nutrients at the shoreline", MRCI interpreted this to mean that not much groundwater is being discharged along this coastal segment in general. The notable exception to this was in Transect 3, near the outlet of Waiopili Stream where several water quality parameters were substantially elevated close to shore, including dissolved nutrients, turbidity, and Chlorophyll a. These were interpreted to be the result of the stream discharging at this point and not groundwater discharge which seems reasonable. Steep gradients of nutrient concentrations, salinity, and turbidity observed in marine waters near the Waiopili Stream outlet led the authors to conclude that, " input from ditch water

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is highly restricted in terms of effects to the marine environment". However, it should be noted that water quality sampling for this study presumably did not occur during periods of high streamflow when the impact zone in nearshore marine waters would be expected to be much larger.

This section of the DEIS does acknowledge that manure could run off into drainage ditches, even with the prescribed 35-foot buffer strips installed on both sides of all waterways at the HDF site. "Manure particles that do not settle out into the buffer area could be carried into ditch waters and downstream with stormwater flows" (p. 4-67). Also acknowledged is the potential of elevated nutrient levels in surface waters and groundwater due to the proposed dairy farm. "Increases in nutrients as a result of dairy establishment or operations can inform modification of the operation's nutrient management" (p. 4-66).

Consistency with State of Hawai'i Water Policies:

This section essentially states, with very little justification, that the proposed HDF project supports the State's Anti-degradation policy (HAR-11-54-1.1) for Inland Waters (Class 1 and 2) and Marine Waters (Class A). There is no acknowledgement of the likelihood for further water quality degradation to occur as a result of this project. Instead, the DEIS language reasons that during periods of heavy rainfall and runoff, the dairy's nutrient losses will be diluted by additional streamflow. As the document states repeatedly, these are the times when nutrients and other pollutants will be mobilized from the dairy farm site so both pollutant concentrations and loads are likely to increase during these periods, not decrease through dilution.

With regard to impacts on the marine environment, the DEIS language simply states that, "There will be no substantial effects to marine water quality from the HDF dairy", reasoning that vigorous mixing near the Waiopili Stream outlet will limit water quality degradation. This explanation is likely based on the limited water quality data collected in the nearshore performed for this study. Again, it is improbable that samples and/or data were collected during high rainfall/runoff events when the bulk of the pollutant loads are transported from coastal watersheds to the marine environment.

Appendix E - Groundwater and Surface Water Analyses:

It is interesting that data presented on the present water levels in Well 14 (private) and the Koloa F well (County) are several feet lower than their original levels. Recent measurements indicate that both of these wells have static levels between 22-26 feet above sea level (MSL), while their original levels at the time of installation were 30.0 feet MSL (Well 14) and 25.9 feet MSL (Koloa F Well). The Well 14 battery was installed in 1928, and the Koloa F well was installed in 1998 so the piezometric head for the deep aquifer underlying the HDF site may have decreased from 30.0 feet in 1928 to 25.9 feet in 1998 to 22-26 feet today. This isn't may not be relevant to the evaluation, but it is noteworthy. Also noteworthy is the estimated hydraulic gradient of the shallow aquifer water table, approximately 35 feet per mile, which would

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probably result in considerable groundwater movement under the proposed HDF site if the alluvial soils weren't of such low permeability.

The report identifies 0.8" of 24-hour rainfall as the threshold for runoff production at the HDF site, with no analysis presented to support this. Also, the report presents some analysis of the 30-year rainfall record from the Maha'ulepu 941.1 rain gage located near the project site. The results indicate that daily rainfall of 0.8" occurs approximately 3% of the time, or 10 days a year on average, in the project area. The same analysis was performed with the same dataset and produced the same results. Note that the rainfall event depicted in this report on November 23, 2015 as 5.95 inches at the HDF site was recorded as 4.48 inches at the Maha'ulepu 941.1 rain gage station, and this was the 11th highest daily rainfall at this station in over 30 years of record. This amount of daily rainfall is exceeded only 0.15% of the time in this area.

In contrast to the use of non-potable surface water proposed for the project (average of 1.31 MGD from Waitā Reservoir), the potable water use of 30,000 GPD (from Well 14) seems relatively modest. Surface water flows moving through the project site are estimated to be 7 times larger than the amount of groundwater moving under the site in the shallow aquifer. Calculations made for the report resulted in estimates of average surface- and groundwater flow rates leaving the makai end of the HDF site as 1.81 MGD and 0.27 MGD, respectively. Of the 1.81 MGD average surface water flow rate, roughly 0.40 MGD is from flat lands in the valley bottom, and 1.41 MGD is from steep lands on the valley walls. Of the 0.40 MGD of surface water originating from the flat lands, approximately 0.31 MGD is sourced from the 557-acre HDF farm site.

To expand on the earlier discussion regarding nutrient load augmentation, Matt Roesener, P.E., performed computations using information provided in Appendix E. Based on the estimates presented in the report for N and P loads carried in groundwater and surface water as well as the projected new N and P subsidies from the dairy farm, we can calculate the expected increase in nutrient loading to local waterways. To do this, the report author computed the total N and P loads leaving the HDF site at the makai boundary based on several assumptions about groundwater flow, rainfall, runoff, and nutrient concentrations in surface- and groundwater. His approach was to estimate total nutrient loads moving downstream from the HDF property, then compare them to the new N and P subsidies. While this approach is defensible and results in useful information, there was no presentation of the increase in nutrient loading from the HDF property alone. The analysis presented in the report included surface- and groundwater flows from the upstream watershed area that drains through the HDF site which resulted in estimates of 6.6- and 8.4-fold increases in N and P, respectively, leaving the makai border of the HDF site. By subtracting the flows and nutrient contributions from the watershed area outside the HDF boundary, the analysis results in 20-fold increases (2000%) in both N and P loading from the HDF site only compared to existing conditions.

Appendix F - Surface Water Quality and Marine Assessment:

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Results of the surface water chemistry testing showed that spatial distribution of dissolved nutrient concentrations essentially displayed the same trends, with the lowest values in the farthest upland (mauka) sample stations, elevated values in the middle stream/ditch reaches within the HDF site, and somewhat reduced values in the lower reaches near the stream mouth (but not as low as levels at the mauka stations). Increases in existing nutrient concentrations within the HDF site were attributed to leachate "subsidies" from ongoing or prior land use. The authors reason that because nutrient values near the stream outlet are similar to the values measured at the mauka stations, concentrations at the makai stations are the same now as they would be without the nutrient leachate subsidy from the HDF site. This defies logic as a simple mass balance would suggest that if the subsidy is removed from the equation, downstream concentrations should be reduced.

Spatial trends in turbidity and Chlorophyll a levels were generally similar to those described above for inorganic nutrients (i.e. lowest at highest stations, elevated in middle HDF reach, lower at lowest stations). The report states that these parameter values returned to "baseline low levels" below the dairy site, but data presented in the report do not support this statement. The spatial trend observed for FIB levels was generally increasing counts moving closer to the shoreline. Many of the FIB samples yielded very high counts for both Enterococcus and Clostridium Perfringens. The higher values were some of the highest Rosener observed anywhere. Because of the notable absence of human residence in the watershed, the authors noted that it is clear that sources other than human presently contribute to the high FIB counts here, many well above the levels of DOH Water Quality Standards, and Rosener agrees although not with the unsubstantiated conclusion that "natural conditions" is the cause.

Marine water quality testing along four transects running perpendicular to the coastline was also completed. Notable results include Transect 3 (starting near Waiopili Stream mouth) exhibiting "substantially higher" values for all dissolved nutrients, turbidity, and Chlorophyll at the 5- meter (offshore) station compared to all other transects. This indicates water quality degradation near the stream mouth which is not surprising. However, values of these parameters were similar to those from the other transects at the 10-meter (offshore) station. The authors concluded that rapid mixing in the nearshore zone quickly brings elevated pollutants down to background levels. While this may be true under most conditions, it is unclear how far offshore this mixing zone extends during the area's frequent heavy rainfall/runoff events when the bulk of the pollutant load is expected to be mobilized and transported.

Appendix K - Hydrologic Assessment:

This report, produced by Group 70 for HDF, represents standard engineering/design hydrology analyses, and nothing contained in it was surprising or exceptional. The report essentially lays out the hydrologic design criteria for various drainage infrastructure and conservation practices to be installed and/or maintained at the proposed HDF property. Traditional design hydrology equations and models were used to compute design discharge values which are presented in the report. The SCS Curve Number method was used to simulate design storms, predicting

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peak runoff rates for various storm frequencies (2-year through 100-year). In comparing the pre-project and post-project hydrology using this model, the only significant change was in the curve number value to reflect a change from pasture grass conditions from "fair" to "good" following dairy establishment. While this may seem like a reasonable assumption, one wonders if to what extent any possible improvements in soil and grass conditions realized from the proposed irrigation and fertilization schedule will be offset by the trampling effect of hundreds of cows compacting soils and generating runoff. Soil compaction was not addressed in any of the DEIS sections or appendices that were reviewed.

The predicted post-project peak flows leaving the HDF site range from 1,723 cfs for a 2-year flood to 11,054 cfs for a 100-year flood. It is hard to imagine the drainage ditches running through the HDF site containing even the 2-year flood flow, and given the large volumes of runoff that can be generated at this site, there is concern about the potential for significant non-point source pollution occurring. Also notable are Figures 8 and 9 which show a small area in the upper, eastern portion of the HDF pasture draining to areas outside of the HDF site to an unnamed drainage ditch. Most of the pasture area appears to drain to the two central drains that run through the length of the farm property.

Soils:

Soils have been characterized appropriately in the context of the proposed action. The DEIS approaches soil management through the USDA NRCS' framework of soil health. Regardless of herd size, the dairy will be dependent on commercial fertilizers. This document should clarify what sources of commercial fertilizers will be used. Slow-release fertilizers, like compost, should be used to minimize the risk of nitrogen, phosphorus, and other nutrient losses. Synthetic chemical fertilizers are generally more labile, and pose a greater risk to being lost more readily to the atmosphere and water.

In section 4.1.2, the DEIS claims that the proposed action and expanded herd will not impact climate conditions at a regional or global scale. While it is technically true that one dairy alone will not alter the climate, it demonstrates a misguided understanding of climate science. In the same way that all cars, but not one car, contributes significantly to climate change, a single farm can contribute to climate change without being a single, large source of greenhouse gas emissions. The proposed action contains elements that may both contribute to climate change (e.g. enteric methane emissions, elevated soil nitrous oxide emissions) and help mitigate climate change (e.g. increasing soil carbon storage). Since high density rotational grazing has not been rigorously studied with respect to its climate impacts, it is unknown whether the dairy will be a net contributor of or solution to climate change.

Appendix C – Hawaii Dairy Farms Soils Baseline Nutrient Status:

Soil testing revealed two important results: (1) soil conditions are highly variable in space and (2) the soil in the proposed project area is nutrient poor due, in large part, to a history of

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intensive sugarcane production. These results are unsurprising but have important implications to future management. It is very likely that proper pasture management will improve soil conditions through the management of vegetation and manure inputs.

Hawaii Dairy Farms underwent two rounds of soil testing, once in 2014 and again in 2015. The more comprehensive testing in 2015 provides invaluable baseline data on soil nutrients that can be used to develop nutrient management plans as well as to compare changes over time with future soil testing.

Regular soil testing is essential to make the best informed decisions about nutrient management and to avoid excess fertilizer or manure application that could result in losses to the environment. While the DEIS emphasizes the importance of soil health, it does not explicitly outline the steps that will taken routinely be taken in the future to monitor soil nutrients. The authors of Appendix C note that the hydrologic report (TNRWE 2016) identified operating skills of the HDF personnel as a primary challenge to managing nutrients, and this point of caution should be taken into consideration. The authors of Appendix C also offer recommendations regarding nutrient management if the proposed action were to be implemented.

Appendix D – Nutrient Balance Analysis:

Waste management plans were prepared with best available local guidelines for livestock waste management. The DEIS plan is to follow best nutrient management practices, including improving the efficiency of nutrient applications through proper timing, placement, amount, and kind of fertilizers. As a framework, these considerations are absolutely critical for minimizing environmental risks from nutrient management. The DEIS reports the first approximation of nutrient mass balance, and promises to update the calculation with measured data annually. When will this annual measurement be taken and how will the reviewing agency ensure that the promise is kept by HDF, year over year?

Roadways and Traffic:

While there will be minimal impacts to public service such as police, fire, libraries, etc. there will be significant impacts due to increased truck traffic for raw milk transport as well as for calves and mature cows leaving and returning to the herd. The increase in vehicular trips is relatively small, but the number of large truck trips to the area and also using State and County roads is significant: 2 round trip truck trips daily to and from offsite ranches; two round trip milk deliveries daily, 4-5 round trip sand and feed truck deliveries monthly, fertilizer once per month and twice weekly milk deliveries to barrages. (p. 4-100)

Cultural Practices and Resources:

The Cultural Assessment was conducted by Scientific Consultants, Inc. (Volume 2, H)

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Mistakes in the history of the area include Captain Cook's journal entry and log in which he describes encountering natives off Maha'ulepu the evening before he sailed to Waimea where he was able to anchor and land - this is not accurate.

The ahupua'a of Maha'ulepu was not owned by the "Crown" until it was sold to Koloa Plantation. Princess Victoria Kamamalu sold it to a Hui of 49 native Hawaiians in 1882 for \$10,000. Hui members' shares were bought by the Plantation and when 2/3rd were acquired, the ahupua'a was partitioned with the remaining native Hawaiian owners holding land outside the valley, including ridges and Aweoweonui Valley (Kaua'i Historical Society Paper by Rev. John Lydgate).

As a group representing Native Hawaiian interests, it is dismaying that no public access is being provided to see, and, for practitioners, to utilize, the native Hawaiian archaeological sites in Maha'ulepu Valley. Even extending the archaeological survey area only slightly beyond the dairy boundaries has revealed petroglyphs and an agricultural heiau.

One of Malama Maha'ulepu's goals has been to reopen the valley to past recreational and cultural use through managed access agreements. Hopefully, this goal is still attainable. Any plans to provide school tours to the dairy operations do not balance nor mitigate the loss of future access to cultural places.

This section is meant to be a summary of the Cultural Impact Assessment (CIA) contained in Appendix H. However, there is no such summary. Instead, there is an overview of the Polynesian settlement in the Hawaiian Islands and Kauai, information that is general and has little to do with Maha'ulepu. In all of two pages of writing, there is approximately one short paragraph of information that is relevant to Maha'ulepu. The summary *should* contain a brief description of the CIA including what a CIA is; how many organizations and individuals were contacted for the CIA; how many individuals and who was interviewed for the CIA; a brief description of the methodology of conducting the CIA; a description of the cultural practices, cultural sites, etc... identified during the review of primary and secondary sources; a list and description of the cultural practices, cultural sites, etc... identified during the interview process; and an "analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices took place."

We recommend rewriting this section (pp.4-31-4-32) to clearly and adequately summarize the work and findings of the Cultural Impact Assessment and correct inaccurate information. Unfortunately, the CIA does not adequately state its own findings making the summary for the DEIS difficult.

Probable Impacts

The HDF consultant identifies two impacts related to cultural practices and resources in the CIA.

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- Isolation of cultural resources from their setting; and
- Introduction of elements that may alter the setting in which cultural practices take place.

What do these two impacts mean in the context of the CIA conducted? When listing the isolation of cultural resources from their setting, is consultant referring to access issues that are expressed repeatedly during interviews? When listing the introduction of elements, is consultant referring to the impact of contaminated surface and groundwater affecting springs, ponds, ditches, reefs, and marine resources—all cultural sites that directly affect cultural practices? We recommend that the analysis of cultural impacts speak directly to the issues and concerns voiced within the CIA. Although the consultant identified and interviewed some knowledgeable interviewees, they did not adequately identify and analyze the cultural impacts expressed by those community members.

We recommend explicitly listing all the cultural impacts in the context of the CIA conducted, including access and contaminated surface and groundwater as it impacts streams, ponds, springs, reefs, and marine resources

Short-Term Cultural Impacts

This section correctly states that Maha'ulepu ahupua'a has and is currently used for traditional cultural purposes, that the project area is not included in these cultural activities, and that there are no significant cultural sites in this area. However, the EIS fails to address the main issues expressed in the CIA which constitute both short-term and long-term impacts. The first is access. The CIA did not identify which are the access points; how do practitioners access the back of the valley, the plateau, the petroglyph rock? One cultural practitioner communicated that he was denied access to a heiau because of the lease with Hawaii Dairy Farms. This is a direct impingement on the right of a Native Hawaiian to freely practice his culture and constitutes an indirect impact. Though the heiau is not within the bounds of the proposed dairy, access to the heiau was denied based on a lease to the dairy.

We recommend spelling out clearly the indirect cultural impacts of the proposed project such as access. In addition, measures to mitigate each cultural impact should be included within this section of the EIS.

Long-Term Cultural Impacts

Again here, the DEIS fails to define what the impacts or mitigation are. The first paragraph states: "The perception of most community members interviewed was that the dairy may have indirect and direct negative impacts on the environment in the area." There is no effort here to list the indirect or direct negative impacts that community members have shared with the consultant. The objective of the CIA is to identify if there could be cultural impacts related to the HDF project and if so, what they are. Reading through the interviews in the CIA, it is clear that

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there are cultural impacts, however neither the CIA itself or the DEIS has made any effort to clearly define and address those impacts.

After stating in the first paragraph that the community members are concerned about indirect and direct negative impacts, the consultant concludes in the second paragraph that "the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy." In light of the first statement, the second statement does not make sense. How can you conclude that traditional cultural practices will not be impacted by establishment of the dairy when the community is telling you the opposite? There is no real effort here to identify, clearly state, and address the concerns of the community.

The CIA should clearly identify and list all direct or indirect impacts to traditional cultural practices as gleaned from historical sources and interviews. The CIA does not adequately do this (please see comments for the CIA). The DEIS does not clearly and adequately state the impacts. After including a list of the impacts, the DEIS should offer mitigation measures for each impact.

Demographic and Economic Conditions:

The basis of the DEIS economic analysis is Hawaii Dairy Farms: Socio-economic Conditions, Economic Impacts, and Fiscal Impacts, conducted by Plash Econ Pacific (PEP) Inc. May, 2016. Note the consultant's disclaimer that "As a general rule, economic and fiscal impact estimates in this report are accurate within about 25%" (p. 1.Vol 2, I-3)

The existing demographics (social and economic) of the Koloa-Poipu area are adequately covered in this study. The Economic Analysis does state that "if nuisance impacts were to occur, which is not expected – it could result in reduced tourism, sales, employment, salaries and wages, property values and personal wealth." (Vol 2, III-8) The enormous potential economic losses are not valued. Although it might only provide small compensation for impacts, HDF should carry a large environmental insurance policy. In addition, HDF could establish a social and environmental remediation endowment, partially funded by a portion of milk sales.

The economic analysis section of an EIS is required to provide a cost benefit analysis of a proposed project as the basis for determining economic and fiscal impacts. The economic and fiscal impacts of HDF's dairy cannot be determined because the EIS does not provide basic information.

What is the price per gallon that HDF expects to realize? The price, even a range of projected prices, at which HDF milk will be purchased by the wholesaler/processor is not disclosed in this "disclosure document." (Table III-3 Economic Impacts At Full Operations)

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The Total Sales for a herd of 699 of \$10,121,716 and the Total Profits \$1,012,172 cannot be substantiated when price is "not shown to avoid disclosure." (Vol 2. Appendix J Part 3 Table 111-3) Using the information provided, the price of HDF milk is \$6.62 per gallon or \$3.31 per half gallon -6 gallon per day x 699 cows = 4,194 gallons of milk per day or 1,530,810 gallons per year divided into total sales of \$10,121,172.

Currently, at Big Save grocery store, Koloa, a gallon of mainland milk is being sold for \$4.99, while a half gallon of Meadow Gold milk is being sold for \$4.19. Both are on sale. While some portion of the Meadow Gold brand milk may have been "grown" on the Big Island, most of that milk is mainland milk that has been re-pasteurized on Oahu.

Price is certainly a factor in people purchasing milk from big box retailers such as Costco where a gallon of milk costs what a half gallon of Meadow Gold milk costs. Another segment of the market buys organic milk. HDF is not producing organic milk.

In the economic analysis there is no discussion of demand. Product demand is generally a part of economic analysis. Apparently no marketing study was conducted. Can HDF milk compete with imported mainland milk? What are Hawaii consumers willing to pay for the "local" milk grown at Maha'ulepu? What is the demand for local, non organic milk? What is the trend in Hawaii regarding milk consumption?

Demand is not independent of price. Put another way, the market for the milk cannot be assumed to be a percentage of volume of milk presently imported, repasteurized, packaged and sold by Meadow Gold.

It appears that HDF does not have a milk purchase agreement in place. If HDF has to process and distribute its milk, the cost per gallon will increase. Even if the milk is not shipped to 'O'ahu, will the cost of HDF milk on Kaua'i be competitive? The following statement verifies the lack of milk purchase agreement: "Eventually, a milk processing plant might be built in an existing industrial area on Kaua'i or 'O'ahu if warranted. The plant would produce finished milk packaged for consumers, and possibly some milk-related products (e.g., yogurt and cheeses)." Vol. 2 Appendix J, I-8 (p. 622). The DEIS should be clear about what is being farmed.

HDF has been negotiating with Dean Foods owner of Meadow Gold Hawai'i. A Wisconsin Public Radio story of Friday, January 30, 2015, stated "Dean Foods is closing dairy plants across the US. "The company, which is based in Dallas has closed 12 dairy plants around the country in the last three years. Management stated that 'Dean has to be smaller to be more efficient and stay profitable." Dean blames higher costs for raw milk and transportation."

The DEIS provided conflicting figures for how much milk *may* be produced. Volume 1 states that the supply of local milk will be increased by approximately 1.5 million gallons annually, a 50 percent increase in statewide milk production." (p. 4-50) The introduction to the DEIS says milk production will increase by more than 1 million gallons. Volume 2, the Hydrologic Assessment

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authored by Group 70, says that "At a steady state, production with 699 cows the dairy farm will produce roughly 1.2 million gallons annually." (p. 693) The Economic Study uses the highest figure for annual production for 699 (or 2000) cows when it forecasts anticipated profits.

The dairy will not increase statewide milk production by 50%. The 2015 Statewide Agricultural Land Inventory states that "Based on data provided in August 2015 by the DOA's Milk Control Program, Hawai'i's dairies produce 3.3 million pounds of milk monthly or the equivalent of approximately 380,000 gallons per month." (p. 42) Hawai'i's production is approximately 4,560,000 gallons per year (12 times 380,000). Therefore an added 1.5 million gallons would be a 33% increase at most. A million gallons would be an increase of 22%.

Incomplete Cost Analysis

Many of the costs of operating this dairy are not disclosed. The only expenditures disclosed in Tables III-2, 3, 4 and 5 are for construction, payroll and property taxes. The following expenses (even just estimated) are not stated:

- annual land lease, (does this lease include any charge for irrigation water or potable water?)
- cost of purchasing the initial cows,
- estimated cost of feed,
- cost of insemination of the heifers,
- cost of boarding "resting" heifers,
- estimated costs of auxiliary personnel such as veterinarians,
- cost of consultation for monitoring,
- cost of agricultural insurance

It is not possible to estimate dairy profits without a full picture of what it costs to operate. The rising cost of feed is acknowledged to be a factor in the closing of dairies, and feed cost will affect HDF too. On the Big Island, where there are two remaining dairies, 40% of feed is now being grown locally. (Statewide Agricultural Inventory, 2015) An environmental damage suit by a Kauai neighbor (due to dairy effluent flow into stream and ocean) against the Moloka'a landowner and Meadow Gold is another factor in the closing of the Moloka'a dairy.

Job Benefits

The number of full time new jobs that the dairy will generate is small. The primary job benefits - both direct and indirect - appear to be during the two year construction period when as many as 36 jobs (28 on Kauai) are posited to be created. However, it does not appear that many of these will be new jobs but design and construction trade work providing a period of employment for existing trade people and suppliers.

During operations, the dairy is posited to provide 5 farm jobs at herd size of 699 and 10 at herd size of 2000 and 6 indirect jobs, 3 on Kauai, 3 on Oahu. The five jobs will include "a farm

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manager, a marketing/community relations person, supervisors, skilled and semi-skill workers." Earnings proposed range from \$40,00 (not adequate to support a family on Kauai) to \$115,000 or more. The study does not state what these employees will do, their training levels, whether they work full or part time.

The revenue to the County and the State appear to be negligible. Those to the State are "offset" by the \$1 million tax credit for improvements on the land designated IAL. How long are these tax credits applicable? Will HDF realize tax benefits if it operates at a loss?

These unknowns greatly affect the immediate and long term viability of the dairy. Ulupono, owner of HDF, is a for profit business. Ulupono has been clear that they intend and expect to be financially successful while achieving the goal of increasing food self-sufficiency.

From the following statements, it appears that it will be many years before HDF is profitable: "At full operations, with herd size of 699 profits on direct and indirect sales are estimated at \$1 million per year and \$2.9 million per year for the 2000 Dairy." Furthermore, "This includes estimated profits of the Dairy, its subcontractors, companies supplying good and services to the Dairy and to the families of the Dairy workers." (p. III-5)

Milk Processing by HDF:

From the beginning, HDF's publicly shared information about the project included the statement that a milk purchase agreement with Meadow Gold (Dean Foods) was imminent. Two years later, does HDF have a milk buyer? Does HDF have a milk processor on any island? Will HDF have to establish its own processing plant on Kauai or elsewhere?

Each of these unanswered questions significantly affects the profitability of the dairy and the price of the milk to consumers. If HDF has to undertake milk processing itself, it will add substantially to overall operating costs. The price of the milk is a major factor in whether the dairy succeeds.

Milk Processing by HDF is considered both an "alternative" (1.7.4.) and "an unresolved issue." However, milk processing by HDF is not actually an alternative in the proposed location with the on-site operations of the dairy. If HDF has to process their milk, the processing plant - whether located on Kauai or Oahu - becomes part of HDF's operations and cannot be assumed to have "no environmental impacts." Assessment would be particularly needed for a Kauai processing plant because "County water, sewage" would be utilized. Nearby businesses and neighbors would be affected. Building permits, health inspections and, possibly, a County use permit would be needed.

Air Quality and Odor Impacts:

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The following is not a negligible or insignificant impact: "*For the contemplated herd size, odor may reach approximately 2,780 feet south of the HDF boundary in the worst-case meteorological conditions.*" (p. 4-109) What are worse-case conditions? Any day when the wind pattern is not regular trades of less than 10 mph? This can occur frequently depending on the time of year and atmospheric fluctuations. This indicates that within ½ mile of the dairy, which means at the Maha'ulepu coast itself and along the coastal trail and on the Golf course, the dairy smells will be experienced.

Visual and Aesthetic Resources:

The dairy site is visible from public vantage points. Maha'ulepu Valley, with its Ha'upu Mountain backdrop, can be seen by people in cars at the juncture of the coastal haul cane road and the Maha'ulepu Mill Road. Walkers view the valley from the trail at the Makauwahi Cave Reserve. The use of this trail is encouraged by two self-guided trail maps: the Poipu Beach Resort Maha'ulepu Heritage Trail Map and the Makauwahi Cave Reserve trail map. (p. 4-19)

One of the long term losses from the dairy as planned is the visual enjoyment of views from inside the valley. Those views include the ones depicted as View A,B,C,D, and E on page 4-20. These views are going to be transformed by the dairy buildings, "mobs" of cows, fences, irrigation pivots, roadways, cow paths etc. – the footprint of this intensive form of dairying.

Allowing the public managed access to walk, ride horses and non-motorized vehicles on the old cane roads around the valley perimeter would provide some residual visual pleasure and health benefits, as well as access to cultural sites.

Flora and Fauna:

The study done by Rana Biological Consulting is incorrect. There *is* federally designated critical habitat in two areas, both within a mile from the dairy site. The Makauwahi Cave is critical habitat for the endemic Koloa blind cave spider and blind cave amphipod. Over the ridge from the proposed dairy is the Pukamoi Headland which is also critical habitat for these cave species. The blind cave species of the Makauwahi Cave system are particularly vulnerable.

Offsite Herd Management:

The proposed dairy site in the DEIS is the primary, but not the only, location of the dairy system. Two auxiliary ranches, located in Kapa'a and Oma'o, as well as the processing plant, are all integral to this dairy operation. The acreage and current herd sizes of these ranches, their present and maximum herd capacities, are not disclosed. The number of animals that will be transported and at what frequency is not stated. The size of the cattle trucks/trailers should be clearly stated. While the privatized Maha'ulepu Mill road will be used for part of those trips, most of this transport will occur on County roads and the State highway. Male calves "will become

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part of the of the beef cattle herd." (p. 1-12) Is this crossbred dairy cow good eating? What will rancher Bobby Farias be charging per head?

Burials:

Many local residents, including Malama Maha`ulepu members, believe the burial of cows in Maha`ulepu Valley constitutes a cultural violation. The designated location for cow burial is the area that is closest to archaeological sites, both known and as yet not inventoried. It is repugnant to envision 699 cow burials in three to five years let alone the number of cows that would be buried with a larger herd over decades.

What are alternative disposal methods for livestock? Is incineration possible, perhaps at the Green Hawai`i facility in mauka Koloa? What are Hawaii's animal disposal regulations? Arkansas, for instance, has loading and site limitations that preclude burying animals at the base of a hill. HDF intends to bury cows at the base of Mt. Ha`upu, the highest elevation of the dairy.

Decommissioning Dairy Operation:

Decommissioning of the project at the conclusion of its 20 year lease will necessitate considerable costs. A "sinking fund" should be established that will allow for either a complete decommissioning and for the removal of the wind farm, or the replacement of the existing wind towers. Without a proper fund being available, this infrastructure may remain as a permanent blight on the Maha`ulepu Valley landscape.

Failure to Take a Hard Look at Impacts of Spills and Ruptures:

One of the greatest environmental concerns associated with the project is the risk that HDF will inadvertently spill animal effluent into the Maha`ulepu Valley water resources. There is an associated concern that HDF and state agencies will fail to respond quickly and thoroughly to such a disaster. There have been a number of recent effluent spills that have devastated rivers and waterways in America and New Zealand. Each of these spills has had ruinous impacts on public health within communities nearby and environmental implications downstream of the spill location. However, HDF fails to provide a meaningful analysis, or make reasonable forecasts and projections, of the potential risks of spills of effluent derived from HDF's operations. Accidents happen and plans should be in place for their eventuality.

Mitigation Measures:

HDF failed to Properly Analyze Mitigation Measures, or Consider Terms and Conditions to Protect the Environment. NEPA Requires Agencies to Consider Mitigation Measures. "[O]mission of a reasonably complete discussion of possible mitigation measures would undermine the 'action-forcing' function of NEPA. Without such a discussion, neither the agency

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nor other interested groups and individuals can properly evaluate the severity of the adverse effects."

Because Maha`ulepu is one of the last remaining open spaces on the south shore and is beloved by both residents and visitors it is important that binding mitigation measures be included in the final EIS. An environmental remediation bond, monitoring regimes with guaranteed community involvement, or even a "good neighbor agreement" are examples of mitigative measures that were ignored by HDF, most likely due to confidence in their existing monitoring methods.

Alternatives:

The alternatives analysis is inadequate because it is not a rigorous exploration and consideration of all reasonable alternatives. The Council of Environmental Quality regulations implementing NEPA require that an agency "rigorously explore and objectively evaluate all reasonable alternatives." 40 C.F.R. §1502.14(a). While an agency need not consider an infinite range of alternatives, it must create a list of alternatives necessary to permit a reasoned choice.

Malama Maha`ulepu does not believe that HDF considered a sufficient range of alternatives in the DEIS. The similarity between and among the alternatives presented in the DEIS and the exclusion of several viable but unexamined alternatives ignore NEPA's mandate that an EIS present decisionmakers and the public with an adequate "range" of alternatives. This failure prevents those groups from making an informed analysis and "reasoned choice."

Malama Maha`ulepu further believes that the DEIS as currently drafted does not satisfy the regulatory requirements found at 40 C.F.R. §1502.14. Those regulations require an agency to present "the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." 40 C.F.R. § 1502.14. The agency must "devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits." 40 C.F.R. § 1502.14(b).

Malama Maha`ulepu finds that the Alternatives analysis in the DEIS fails to meet the above requirements. In reviewing the matrix of impacts to multiple resources, there is very little variation from one alternative to the next, suggesting that either there is an insufficient range of alternatives or an inadequate analysis of impacts presented (or both).

In addition, the impacts analysis is inconsistent and attention to detail disparate among the various alternatives, preventing decisionmakers and the public from evaluating the comparative merits of alternatives A, B, and C. Such a cursory analysis is exceedingly unhelpful to the decisionmakers and to the members of the general public who are trying to discern the costs and benefits of the various alternatives.

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Non-Viable Alternative: Conservation Condemnation

After conducting a natural, cultural, agricultural, historical and recreational inventory, Malama Maha'ulepu recognized that the entire undeveloped ahupua'a of Maha'ulepu comprises a cultural landscape. Agriculture is part of that history. Malama Maha'ulepu supported the IAL designation for the valley for that reason and because the Grove Farm Agricultural Master Plan proposed uses that were compatible with preservation of the other heritage resources and experiences. Malama Maha'ulepu failed to envision the use of the Valley lands for an intensive technological agricultural operation and considers this a misuse, incompatible with the Agricultural Master Plan intentions. The question of whether the dairy partially or entirely degrades the land, the stream and ocean waters, and the recreational experiences of the coastal area is the heart of our concern about the proposed project, not agricultural use per se.

Longtime community desire for preservation is discussed in the DEIS (p. 54) The State Legislature Resolution of 2001, referenced in the DEIS, only supported dialogue to explore options for conservation. It did not stipulate government ownership. Government ownership is one possibility, and, even in that event, land could not be "taken" without compensation.

No landowner's right to plan for land would be abrogated by discussions of possible future options for Maha'ulepu. Landowner's planning is always balanced by the public right to participate in commenting on any plans which require government review/permitting.

In addition, parks and preserves can be created in more ways than by eminent domain. Indeed, the federal government will not create any kind of national park if landowners are not willing sellers nor partners.

Conservation and business minded landowners can hold private ownership and allow public uses through conservation easements. (These are also used to perpetually protect agricultural lands.)

Parks also increase the economic value of surrounding lands. The National Park Service recently released a study showing that the value of America's national parks is 92 billion dollars. But all kinds of parks add value to communities by increasing visitor spending for accommodations and services nearby, by making people healthier mentally and physically, by increasing nearby property values, by offering educational experiences and engagement and in the case of a natural area park, allowing open land to sequester carbon, increase groundwater, and filter waste water.

Cemetery:

If removing the valley lands from the IAL designation were to be considered as a potential alternative, then another use for the valley would be as a green burial cemetery and sanctuary with memorial forests and orchards.

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Maha'ulepu is already a historic burial area, particularly in the coastal dunes and in caves. Some of the area's inherent power comes from that mana. Furthermore, people have scattered the ashes of family members along the coast and in the ocean. While not as costly as traditional burials, green burials are a business. Indeed, people would very likely pay for the opportunity to be buried at Maha'ulepu, to scatter family remains in the ocean or to commemorate loved ones with a fruit or forest tree.

Agricultural Subdivision:

The use of the valley for agricultural subdivision should have not even been posited because the land is designated IAL (Important Agricultural Lands). However, as depicted, 45 homes and 371 acres of diverse agricultural crops would likely generate more jobs than the dairy.

Alternative Location for the Pasture-Based Dairy:

This alternative location presented was an impossibility at the time the DEIS was being written. County real property tax records show that the alternative parcel (972 acres in Puhi) was sold in 2013. To suggest it as an alternative site in the DEIS shows disrespect for the process. The DEIS failed to analyze several other parcels that could be seriously considered as alternatives and are owned by Grove Farm Co. or its subsidiaries, (Maha'ulepu Farms, Ha'upu Land Company, Visionary Lands).

Furthermore, sites not owned by Grove Farm could also have been considered. Nothing in the DEIS demonstrates a contract that obligates HDF to locate on Grove Farm Land. If there is such a financial commitment, it should be disclosed in the economic analysis because a non-revocable lease agreement constitutes a significant annual operational cost. Why was land exchanging not considered for state lands upcountry from Hanamaulu? Why were locations on other islands not considered? While these alternatives might mean short-term monetary losses for HDF and perhaps Grove Farm, long term relocation to a more suitable site could be cost saving and not present all of the negative impacts of the Maha'ulepu location. The Final EIS needs to take into consideration other reasonable locations both on Kauai and elsewhere in Hawaii that meet HDF's acreage and water access needs.

No-Action Alternative

This critical section of the EIS is self-serving. First, no agricultural alternatives to livestock grazing are considered. Landowner Grove Farm produced an agricultural master plan in 2008 which proposed significantly more kalo cultivation (300-400 acres) and leasing land for a variety of vegetable and fruit crops. Crop cultivation was to be directed by a "master farmer" and produce was to be packaged and distributed from the old Koloa Mill Site. Continuing to work to fulfill this plan is an equally valid status quo alternative to the dairy.

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Furthermore, the assumption that raising cattle would eliminate "special provisions for managing agricultural land use, cover crops and runoff" implies that Grove Farm, the landowner, would never embrace or require best management practices of ranchers. Avoiding NRCS standards would not be possible with an increased number of cattle in the valley.

Smaller Herd Size

Another important alternative is the implementation of a smaller herd size. It may be that the site cannot responsibly support the 699 cows. The amount of milk that several alternative herd sizes would produce should have been included, as well as the longer period the project would have to attain profitability.

Conventional Feedlot:

The conventional feedlot dairy alternative is highly improbable. This type of operation is currently struggling on the Big Island and elsewhere. On the other hand, since any dairy operation would achieve the stated purpose of increasing local milk production, a dairy herd of any size including a small feedlot operation with various manure management techniques such as methane digestion, would be an equally possible alternative.

Revised Draft EIS

It has come to the attention of community members and Maha'ulepu stakeholder groups that HDF has modified the DEIS before and during the 45 day public comment review period in response to feedback from the reviewing agency. This creates a moving target for review as it is impossible to ascertain what components of the DEIS have been modified and thereby decreasing the usefulness of public comments.

HDF must prepare a Revised Draft EIS to allow reviewers to comment on an un-modified draft. Although an EIS is prepared in two phases (i.e., a draft and final phase), the draft EIS must fulfill and satisfy, to the fullest extent possible, the requirements established for an FEIS. 40 C.F.R. § 1502.9(a). NEPA regulations mandate that "[i]f a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion." Id. The DEIS modifications prior and during the public comment period effectively undermines "the twin goals of environmental statements: informed decisionmaking and full disclosure" by depriving the public and decisionmakers of the chance to understand those impacts, and to review and comment on an analysis of those impacts. These EIS Rules are codified under chapter 200 of the Hawaii Administrative Rules.

Conclusion:

Malama Maha'ulepu believes that deficiencies in the DEIS, along with ongoing modifications to the draft, frustrate informed public discourse about the impacts of the proposed dairy operation,

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prevent decisionmakers from considering an adequate range of alternatives and making an informed choice among alternatives, and thus violate the mandates of NEPA.

We request that DOH remedy the deficiencies described and allow the public to provide comments on the DEIS before making any decisions about the dairy operation.

Malama Maha'ulepu requests that the reviewing authorities find this DEIS incomplete and premature. Without including changes made to the document prior and during the public review, the project is not in compliance with the environmental review laws of the State of Hawaii. We request that the DEIS be resubmitted when the missing information can be included and when the above-mentioned inconsistencies, omissions, misstatements, inaccuracies, and other comments have been adequately addressed.

Community participation is key to developing a comprehensive EIS and we appreciate this opportunity to share our remarks. We look forward to providing thoughtful review and scrutiny to the revised DEIS document.

With Aloha,

Greg Peters
Executive Director,

Malama Maha'ulepu
PO Box 1691
Koloa, Hawaii
96756

Malama Maha'ulepu
Comments on DEIS for Hawaii Dairy Farms' Proposed Dairy Operation

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ATTACHMENT 3
GROUP 70 INTERNATIONAL RESPONSE LETTER TO MALAMA MĀHĀ'ULEPŪ,
DATED JANUARY 3, 2017

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January 3, 2017

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Subject: Hawai'i Dairy Farms Final Environmental Impact Statement (EIS)
Māhā'ulepū, Kōloa District, Kaua'i, Hawai'i
Response to Comment on Draft EIS

Dear Mr. Peters:

Thank you for your input dated July 25, 2016 on the Hawai'i Dairy Farms (HDF) Draft EIS. The following responses are offered to your comments.

Pastoral Rotational Grazing Dairy Examples

Successful pastoral dairies exist at numerous locations in New Zealand, as well as suitable farming regions in the United States. Several rotational grazing dairy operations located in Florida and Georgia operate successfully, with farms containing over 2,000 animals. Successful rotational grazing dairies also exist in Maryland, North Carolina, and Missouri. Numerous articles and publications on rotational grazing dairies are cited in Progressive Dairyman and other industry news sources.

Natural/Cultural Environment

The natural environment of Kaua'i is embodied by active farming on lands intended for agriculture. The EIS addresses the existing visual and aesthetic resources of the dairy site, and the potential impacts of Hawai'i Dairy Farms. EIS Section 4.5 addresses potential effects to public scenic views. The County of Kaua'i General Plan identifies the HDF site as agricultural land in a region consisting of open space, parks, and conservation lands in the mountains and along the coast. The important visual landforms identified in the surrounding region are Pu'u Hunihuni Crater to the southwest, the scenic roadway corridor of Ala Kinoiki Road, and the Hā'upu Mountains that surround the project area to the northeast.

The dairy site is not visible from public vantage points along public roadways and areas along the coastline. Vegetation and topography screen public views of the Māhā'ulepū Valley lowlands. Dairy farm structures will conform to County height limits for agricultural zoned land. These items are in keeping with the agricultural character of the area, and would be expected to have minimal to no impact on public views of the Pu'u Hunihuni crater, views from the Ala Kinoiki Road corridor, or the views of the Hā'upu Mountains surrounding the project.

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The development and long-term operation of HDF will be in full compliance with its agricultural State Land Use District designation, ALISH classifications, and County zoning. The dairy farm will embody the intent of the IAL designation per the Hawai'i State Constitution, by using these protected lands for the intended purpose of diversified agriculture, food production and agricultural self-sufficiency. HDF development of a dairy also supports the "secondary intent" for lands in the Agriculture land designation, to provide an opportunity for Kaua'i citizens to reside in an agricultural community. This is in contrast to the described "agricultural subdivisions" that have changed parts of Kaua'i intended for a rural landscape, with development as quasi-suburban landscapes dotted with residences on large lots.

Dairy Herd Size

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land.

Carrying capacity is determined by nutrient inputs and outputs. HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). A Technical Service Provider knowledgeable in NRCS Conservation Practices was retained to work with HDF technical advisors in determining a nutrient balance for the Māhā'ulepū site. Application of manure can benefit soils by improving organic matter which helps to increase water infiltration and improves the soils' ability to support pasture growth and root establishment. Components of a Nutrient Management Plan developed for HDF is described in the EIS Section 3.5.4.2 *Nutrient Balance* and are included in the *Nutrient Balance Analysis for Hawai'i Dairy Farms* attached to the EIS as Appendix D.

With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, regardless if the operation is feedlot or pasture-based, additional regulatory review and permitting by the State Department of Health would be required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to submit an application to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

Groundwater

The depth to groundwater within the alluvial layer is varied. The relatively shallow groundwater within the alluvial material (highly weathered lava composed of silty clay) is hydrologically separated from deep groundwater (the source of the County drinking water wells) that lies within unweathered volcanic material. Wells drilled into the shallow alluvial groundwater bodies to facilitate water quality monitoring reveal that the depth to groundwater ranges from 8 feet below surface to 24 feet below surface. In general, groundwater in the alluvium slopes downward in the mauka to makai direction, but not at the same gradient as the land surface. Depths to groundwater will not be the same across the site. Groundwater levels in the alluvial layer are 30-feet to more than 50-feet higher than the piezometric head of the groundwater in the confined underlying volcanic series, which is the source of drinking water. Sections 4.16 *Hydrology* and 4.17 *Surface Water Resources & Nearshore Marine Environment* and Appendices E and F contain further information on the analyses.

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Surface Water and Nearshore Marine Water Quality

There will be ongoing natural inputs to Waiopili Ditch contributed from the overall watershed and the agricultural lands bordering the ditch downstream of the dairy. With the measures being taken by the dairy to actively manage surface runoff, nutrients and suspended sediments, concerns about the potential effects of dairy operations to ocean beach recreation are not anticipated.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and public concerns about the proposed dairy prompted the Hawai'i State Department of Health (DOH) Clean Water Branch (CWB) to conduct a "Sanitary Survey" of the Māhā'ulepū sub-watershed and the adjacent Waikomo watersheds. DOH CWB conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. The Sanitary Survey findings resulted in an expression of concern by DOH CWB that the number of injection wells and cesspools in the adjacent Waikomo watershed, which includes Kōloa and Po'ipū, are impacting the waters of the Waiopili Ditch.

The geological and hydrological composition of the highly urbanized Po'ipū/Kōloa watershed differs from Māhā'ulepū sub-watershed, resulting in different rates of groundwater movement. Groundwater velocity under the proposed HDF site is on the order of 1.2 feet per day, while the groundwater under the Po'ipū-Kōloa watershed area averages 10 feet per day. The faster movement of groundwater reduces the attenuation period of bacteria, viruses, and nutrients that occurs with movement through soils.

The Part 1 Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors to the fecal indicator bacteria (FIB) levels in ditches running through Māhā'ulepū Valley. CWB noted that Waiopili Ditch is a man-made drainage ditch on private property, and is not an inviting recreational body of water utilized by people. Further testing is needed to more clearly identify whether the source(s) of FIB is human or animals, and DOH CWB has partnered with a University of California laboratory to more definitively determine the source of the fecal contamination in Waiopili Ditch. Results will be published as Part 2 of the Waiopili Ditch Sanitary Survey. The Waiopili Ditch Sanitary Survey, Kauai Part 1 can be accessed on the DOH Clean Water Branch website under "Library" (<http://health.hawaii.gov/cwb>).

Long-term ocean water quality monitoring has been initiated to provide a baseline for the nearshore ocean waters. HDF will regularly sample and analyze nutrient and chemical constituent levels in the near-shore marine environment. Data from the nearshore water monitoring program will be made available to the DOH CWB, dairy neighbors and the local Kaua'i community, and will allow for evaluation of possible contamination sources.

State Water Policies

With the management measures in place, the limited effects of the dairy operations will be consistent with State Water quality policies. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the

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elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the EIS as Appendix F.

Technical Appendices Comments

Your comments address several of the EIS technical reports included in the appendix. This response addresses each of your comments. We further direct you to the responses to EIS comments on the EIS technical studies, which are included as addendum memoranda attached to the relevant study.

Appendix E - Groundwater and Surface Water Analyses

Groundwater levels are addressed in the groundwater study by TNWRE (EIS Appendix E). Rainfall rates and use of non-potable surface water is addressed in the Nutrient Balance Assessment. The study addresses groundwater and surface water flows through the property.

HDF notes in its NBA that it will not irrigate within 2 days and after 2 days of a significant rain event, allowing the pasture to dry. The soils will not be saturated on a regular basis with irrigation as effluent and irrigation will be applied not to exceed the agronomic need of the crop. Runoff will be attenuated by the thick kikuyu thatch created by the establishment of "good" pasture conditions.

In terms of nutrient loading, HDF will not apply nutrients past the plant uptake requirements and agronomic need. In both the 699 mature dairy cow and 2,000 mature dairy cow scenarios, at a grass yield of 16.3 tons of DM per acre per year, there is simply not enough nitrogen nutrient from manure sources (as-excreted, liquid effluent, slurry applied) and a slight excess of phosphorus. HDF will not apply excess phosphorus because the herd size would be increased incrementally, to ensure no over-application of nutrients. Ultimately, commercial fertilizers will still be required. Nutrients are broken down quickly and absorbed by the crop. Cows are rotated so over-application of nutrients does not occur.

Appendix F – Surface Water Quality and Marine Assessment

Surface water chemistry results by MRCI are presented in EIS Appendix F. The EIS documents the existing conditions of the nearshore marine environment, including a characterization of the biotic environment where water flows to the ocean through Waiopili Ditch. Comparing the characterization of nutrients and biological constituents from surface water samples to those water samples taken in the nearshore marine area reveal that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is a result of physical mixing of water masses. The water sampling results show that elevated levels of indicator bacteria do not extend beyond the shoreline. See EIS Section 4.17.3 *Nearshore Marine Waters*, and Appendix F. Ocean water quality sampling and analysis demonstrates the reduction of terrigenous inputs from the Waiopili Ditch discharge, due to the substantial physical mixing conditions in the nearshore ocean regime. High precipitation periods typically generate larger runoff events resulting in a greater extent for dispersion of the ditch runoff inputs into the nearshore waters.

Appendix K – Hydrologic Assessment

As you note, the hydrologic analysis by G70 provides a reasonable analysis of the storm runoff flows at the dairy farm. The rotational grazing operation will avoid excessive soils compaction in the paddocks. HDF intends to include best management practices to protect water quality within the man-made and natural portions of Waiopili Ditch, as well as the coastal waters and beach. Such practices included installation of 35-foot wide vegetated buffers and filter strips, 50-foot setbacks with effluent irrigation, on-site retention

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areas adjacent to the raised raceways, and development of the Kikuyu thatch which will attenuate surface runoff and prevent pollutants from reaching the on-site water ways.

If the off-site cutoff ditches are maintained as planned (and as agreed by the landowner), run-on towards the site will be significantly reduced (as it will be diverted along the valley walls and downstream of the HDF site), and therefore the potential for surface runoff through and from the paddocks is significantly reduced. This will reduce the amount of potential nutrient discharge through surface runoff, which is why the estimation of nutrient loss through surface runoff, utilized in the water quality assessments in the DEIS, is minimal from the farm site. Most of the rainfall will remain on-site and percolate for use by the crop.

Soils

As cited in your comments, the soils have been characterized properly in the EIS.

Climate Impacts

There are no State or Federal regulations for greenhouse gas emissions from farm operations or small businesses. However, livestock and agriculture as an industry contributes to greenhouse gas emissions, so HDF engaged a technical expert to model potential greenhouse gas (GHG) emissions based on the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, as no dairy is currently in operation. The GHG emissions included methane and nitrous, converted to carbon dioxide equivalents (CO₂e) using the IPCC's AR3 global warming potential (GWP) that relates the GHG to CO₂. The IPCC Parameters for Oceanic dairy cattle in warm climates were selected as most applicable to the rotational-grazed dairy operation and conditions at HDF. See the EIS Sections 4.19 and 4.26, and Appendix I for complete information.

The emissions potential for GHG at HDF with the committed herd size of 699 mature dairy cows was estimated as 2,693 CO₂e metric tons (2,969 U.S. tons) per year. This is equivalent to the GHG generated by 170 4-person households. Potential GHG emissions from the contemplated future herd size of up to 2,000 mature dairy cows was estimated at 7,705 CO₂e metric tons (8,493 U.S. tons) which is equivalent to 485 4-person households. GHG estimates for household energy consumption includes home energy use, transportation and waste.

While the presence of cows may increase GHG, a long-term beneficial impact of the grazing fields is the sequestration of carbon as CO₂ captured by the process of photosynthesis by the grass. According to recent studies in the Soil Science Society of America Journal, converting formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, which enhances soil quality, grass production, and has the potential to offset up to one-third the annual increase in CO₂ production of an area.

Operational practices to protect air quality by reducing nitrogen emissions will come from guidance in NRCS Conservation Practice Standard 590, Nutrient Management. Application of nutrients must be adjusted to minimize negative impacts of GHG release to the environment through adjustments to the source, timing, amounts, and placement of nutrients. Specific practices to be utilized at HDF include: slow release fertilizers; nutrient enhancement technologies; and stabilized nitrogen fertilizers.

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Appendix C – Hawaii Dairy Farms Baseline Nutrient Status

We acknowledge your statements that HDF plans for proper pasture management will improve soil conditions through the management of vegetation and manure inputs. Soil nutrients will be tested and monitored on a regular basis.

Appendix D – Nutrient Balance Analysis

Annual monitoring of nutrient application is part of the requirements of HDF compliance with State DOH rules. The dairy will file regular compliance reports.

Roadways and Traffic

Truck transport of calves and mature cows to and from off-site ranches is accounted in the traffic projections for the EIS. EIS Sections 4.18 and 4.25 include an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Traffic operations along Māhā'ulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

Cultural Practices and Resources

As part of the EIS process, the HDF project is subject to a historic preservation review by the State Historic Preservation Division under Hawai'i Revised Statute Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey and a Cultural Impact Assessment were conducted by Scientific Consultant Services for the proposed project. Members of the cultural community on Kauai were interviewed as part of the CIA. Sections 4.7 and 4.8 of the EIS provide an evaluation of archaeology and cultural resources, with the full reports in Volume 2, Appendices G and H. This included communication with organizations having knowledge of the project area, its cultural resources, and its practices and beliefs. Letters were sent to generally engage with the cultural community, with follow up telephone inquiries and referrals. Outreach meetings included individual and small group discussions, site visits, and a large group meeting held in February 2015. Once interview candidates were identified, in-depth personal meetings were held with individuals willing to share such knowledge.

Traditional and historic use of the Māhā'ulepū area includes intensive sugarcane cultivation throughout the entire valley (including the project area), as evidenced by the infrastructure in the valley. Early 20th century maps also document the extent of the fields throughout the Kōloa area, showing the entirety of the current project area consisted of sugarcane lands. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

The State Historic Preservation Division accepted the AIS December 19, 2016 (Appendix G). SHPD concurs with the significance assessments and mitigation recommendations in the AIS, which identifies the 14 plantation-era sites within the project area as significant only under Criterion d (information potential). The letter states no further work is recommended for these sites (50-30-10-2251 through 2262). Two sites outside the Project Area, an enclosure (Site -2250) and a petroglyph complex (Site -3094), were assessed as

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significant under Criterion d (information potential) and e (cultural value). The SHPD letter states that the current proposed project will not affect these two sites, and no further mitigation is recommended for the project.

Based on the AIS and CIA technical reports, no significant cultural resources are located on the HDF property. Access to adjacent properties will continue to be the responsibility of the land owner, Mahaulepu Farm, LLC.

Demographic and Economic Conditions

EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J. Results of technical studies and the findings of this EIS show no unmitigated nuisances that could affect property values as a result of dairy construction or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. Noticeable nuisance impacts outside the Dairy will be limited to adjacent farm and ranch lands owned by Māhā'ulepū Farm, lessor of the Dairy property. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area. Nuisance and footprints of typical dairies found on the mainland are not the same as HDF, which will be a modern facility that utilizes rotational pasture-grazing.

The review of property values adjacent to beef cattle operations in the Kōloa region reveals newer homes with large square footage in a luxury residential community with 2016 assessed values of \$1,297,150 per lot, to \$2,893,100 per lot with a home. the proposed dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

Milk Business and Processing

HDF business agreements are proprietary and will not be announced publically. Permits associated with the operations of other businesses are not the responsibility of HDF.

Air Quality and Odors

Unlike a conventional feedlot dairy facility that must collect and store all manure produces until future disposal, the majority of manure from a pastoral-grazing operation will be deposited directly on the pasture where it will break down and be incorporated into the soil within a one- to three-day period.

Without a dairy in operation, computer-generated modeling was used to determine the potential impact. Results for the committed herd size of 699 mature dairy cows using typical effluent irrigation conditions show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or just 44 hours per year, within one-quarter of a mile south of the dairy farm boundary. For wet periods, odor could extend approximately 2,151 feet (less than one-half of a mile) beyond the southern boundary. The closest public use areas beyond the odor extent south of HDF are a stable and golf course, both approximately 0.5 miles further south, and the closest residential and resort units are 1.3 miles beyond the possible odor extent (EIS Figure 4.19-1).

HDF has elected to restrict slurry application to periods when wind speeds are between 9 and 20 mph. With application at the most impactful location, paddocks south of the taro farm, the odor from slurry application barely crosses the southern boundary. Due to wind speeds within this range occurring on

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average 243 days of the year, the 99.5th percentile is reduced to potentially perceiving the odor just 29 hours per year.

For the potential future contemplated herd size of up to 2,000 mature dairy cows, during unusually wet periods, with application at the most impactful location – paddocks south of the taro farm – the odor from slurry application could extend approximately 1,580 feet, or less than one-third of a mile. The odor isopleth for the typical irrigation effluent extends beyond the dairy farm boundary approximately 3,070-feet (over one-half mile) which would not reach recreational or residential areas. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown.

Under either herd size, odors would not reach recreational or residential areas. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths. The full odor report can be found in Appendix I. The comment regarding methane production is addressed earlier in this response under the climate subject.

Visual and Aesthetic Resources

The EIS addresses the existing visual and aesthetic resources of the dairy site, and the potential impacts of Hawai'i Dairy Farms. EIS Section 4.5 addresses potential effects to public scenic views.

The County of Kaua'i General Plan identifies the HDF site as agricultural land in a region consisting of open space, parks, and conservation lands in the mountains and along the coast. The majority of the project area has gentle topography, with no evident physical features standing out within this broad agricultural valley. The dairy site is not visible from public vantage points along public roadways and areas along the coastline. Vegetation and topography screen public views of the Māhā'ulepū Valley lowlands. Dairy farm structures will conform to County height limits for agricultural zoned land, and would be expected to have minimal to no impact on public views of the Pu'u Hunihuni crater, views from the Ala Kīnoiki Road corridor, or the views of the Hā'upu Mountains surrounding the project.

Flora and Fauna

There are no known caves or lava tubes found at or adjacent to the dairy farm property. The nearest cave of the Kōloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua'i Cave Wolf Spider and the Kaua'i Cave amphipod, is located .75 miles from the dairy farm property. There is no evidence of lava tubes or caves on the property, and no such features have been reported for the area near the HDF site. No cave invertebrate species will be affected by the dairy farm.

Based on hydrological knowledge derived from all drilled wells analyzed by Nance, the downslope movement of ground water from below the pastures toward the habitats of listed arthropods will not reach into the referenced habitats. Recognizing that the food supply of the wholly saprophagic amphipod is organic matter derived from roots and other decaying plant debris, and since nitrogenous and phosphoric nutrients will promote plant growth, their effects, if anything at all, can be expected to expand the food supply in this oligotrophic subterranean ecosystem.

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Offsite Herd Management

Cattle ranching on Kaua'i spans generations, and ranchers are stewards of the lands: healthy lands raise healthy beef cattle. Ranchers are experienced in animal welfare, and can collaborate with HDF to care for dairy cows during annual rest cycles and to raise calves until old enough to join the dairy herd. The availability of calves from a dairy such as HDF provides new animals to maintain or expand a beef herd.

Management of the calves and dry cows is discussed in EIS Sections 3.7 *Offsite Herd Management by Kaua'i Ranchers* and Section 3.8 *Contemplated Herd Size*. Section 4.26.2 *Potential Secondary Effects* notes that HDF will provide a source of calves for the local ranching industry, possibly allowing ranches to replace their existing cow-calf operations and instead procure live calves. Each ranch will make decisions based on business and operational goals.

Section 4.20.2 *Potential Secondary Effects* documents anticipated offsite transportation as up to one truck trips per day for herd management to transport cows between HDF and the offsite ranches. For the contemplated herd size, Section 4.26.2 *Potential Secondary Effects* (Contemplated Herd Size) identifies two truck trips daily to transport cows between HDF and the offsite ranches.

Burial of Cows

HDF has adequately planned its cemetery site and incorporated Best Management Practices required to protect water resources surrounding the HDF site. The anticipated animal mortality rate for HDF is typically less than 2 percent for productive cows, with higher rates in young and stillborn calves, for a total of less than 5 percent for the herd. The animal cemetery is specifically located on the uphill side of the farm, in an area of relatively flat pasture. Site selection criteria for the cemetery paddock included protection from prevailing winds, and distanced more than 100 feet away from any drainageway, 200 feet from any natural watercourse, 300 feet from any well, and more than 20 feet from any buildings. Within the cemetery paddock, pits will be sited based on soil suitability and slope. An area of approximately 5,000 square feet is needed for the animal cemetery at the contemplated herd size of up to 2,000 mature dairy cows, which is a fraction of a 3- to 5-acre paddock.

A containment berm will be created around the pit area to prevent both run-off on to, and from, the cemetery site. Six (6) pits, approximately 20' x 40' overall and 8 to 10' deep, are designed to accommodate carcasses of up to 150 cows and 360 calves or stillborn animals at the contemplated herd size. Individual pits within the area will be a minimum of 2-feet wide with a length appropriate to bury the carcass. Pits will be lined in accordance with NRCS Conservation Practice Standard, Animal Mortality Facility Code 316, to protect groundwater quality. Each animal carcass will be dusted on all sides with ground limestone. The bottom of each pit will be also dusted. Pits can be reused every 18 to 24 months, which is the typical time for a carcass to decompose.

Pit bottoms will be level, and carcasses will be placed in a single layer and covered with at least 2 feet of organic material. Multiple layers may be created with subsequent burials, or additional area within the cemetery paddock may be used as needed. Based on preliminary analysis, HDF does not anticipate encountering groundwater in the cemetery paddock area when excavating the pits. The paddock area will not be grazed.

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HDF may also consider procuring and installing an incinerator to use for managing mortality on the farm. The incinerator would meet the appropriate guidance from NRCS Conservation Practice Standard – Animal Mortality Code 316 as well as State and EPA emissions regulations, to ensure no adverse air quality impact from the incinerator operations.

Dairy Decommissioning

In the event of a future closure of the dairy operations, the owners would conduct decommissioning actions as required in compliance with the terms of the agricultural lease with Mahaulepu Farms, LLC. Your comment addresses decommissioning a potential wind farm, which is not relevant to the proposed action.

Effluent Storage Pond

HDF will comply with all regulatory requirements for siting of the effluent storage ponds. The EIS specifies the regulatory requirements in Section 3.3.2.4 *Effluent Storage Ponds*, and Figure 3.3-5 displays the 3,420-foot distance between the ponds and the public drinking water resources, and the 125-foot distance to the nearest on-site drainage ditch. Further, while the ponds' distances from water resources exceed the State of Hawaii's Department of Health *Guidelines for Livestock Management*, HDF has elected to line the ponds to protect against seepage into surrounding soil; the liner will meet the standards of the NRCS Practice Code 313.

The United States Department of Agriculture (USDA), NRCS, State of Hawaii Department of Health, and other published guidelines for agricultural practices within the United States agree that the 25-year, 24-hour event is the design standard for waste storage systems. Planning and designing for events greater than this is simply not required by regulators and unreasonable.

HDF has provided additional storage capacity beyond the 25-year, 24-hour storm event in the form of extra storage within the effluent ponds, as well as a secondary containment berm, which exceeds regulatory guidelines. The secondary containment area and berm essentially provides an additional 30 days of effluent storage, or nearly 50% more volume than the storage pond provides in the 2,000 cow scenario, enough to hold another two – 25-year, 24 hour storms.

Mitigation Measures

Pursuant to HRS Ch 343 and Title 11-200 HAR, Section 4.0 of the HDF EIS includes the presentation and discussion of mitigation measures to minimize or avoid potential impacts. Substantial mitigation actions are included in the planned design and operation of the dairy. As appropriate, significant mitigation measures will be implemented to minimize or avoid adverse effects to the natural and human environment.

Alternatives

As a part of the EIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in EIS Section 6. Of all the alternative actions and locations considered, the planned agricultural operations of Hawaii's Dairy Farm is the only approach that achieves project objectives and meets each of the five Evaluation Criteria described in EIS Section 2.3.4.

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The suggested alternative for conservation condemnation/easement would not satisfy the project objectives and evaluation criteria. Further, we are not aware of any serious proposal or offer for conservation easement being made to the landowner. Another suggested alternative for cemetery operation would not satisfy the project objectives and evaluation criteria. These options would preclude the food production capacity of this important agricultural land, as designated by the County and State.

Alternative dairy locations were carefully evaluated in the EIS, with specific consideration of achieving the project objectives and meeting each of the five Evaluation Criteria. The selected site represents the best option among those considered. The alternative location studied in the EIS is a valid representation of other siting options available. Preliminary site screening found other locational options to have unsuitable or less desirable conditions for the dairy in terms of land control, IAL status, soils, slopes, climate, water courses, neighboring uses, access and other factors.

To provide a meaningful analysis, the EIS evaluation of other alternatives (no action, agricultural subdivision, conventional feedlot) each included quantitative estimates of potential uses and associated impacts.

Draft EIS Content

The publication of the Draft EIS included information necessary to meet the content and submittal requirements pursuant to HRS Ch 343 and Title 11-200 HAR. All reviewers of the Draft EIS were provided the same information on the same date.

The modifications to the 2014 Waste Management Plan were submitted to the Department of Health "shortly before" the Draft EIS was published two weeks later. The Draft EIS analyzed the project elements, including those summarized in the letter to DOH. The Waste Management Plan is a technical document that is not part of the EIS or subject to public review and comment. However, all of the nutrient information is addressed in the EIS as part of the Nutrient Balance Analysis.

Your comment, along with this response, will become part of the public record and will be published in the Final EIS. A copy of the Final EIS is included on a compact disc with this letter. When published, the Final EIS will be available on the OEQC website which you can access using the following URL, and search "Hawaii'i Dairy Farms": <http://tinyurl.com/OEQCKAUAI>.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.



Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Greg Peters, Executive Director, Malama Maha'uiepu
Hawaii'i Dairy Farms Environmental Impact Statement
January 3, 2017
Page 12 of 12

cc: Hawaii'i Dairy Farms
Hawaii'i State Department of Health,
Environmental Planning Office

ATTACHMENT 4

**EILEEN KECHLOIAN COMMENT LETTER TO THE DEPARTMENT OF HEALTH AND
GROUP 70 INTERNATIONAL, DATED JULY 25, 2016**

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Hoku Keamoai
January 3, 2017
Page 2 of 2

Under the proposed action, HDF would sell raw milk wholesale to a processor and packager. Milk processing, including pasteurization, bottling, and packaging of milk, would be done independently of the dairy. For more information on processing, see EIS Section 3.6.

Milk distribution decisions will be determined by Meadow Gold at a future time. Meadow Gold is the only statewide distributor of milk products processed locally from both U.S. Mainland and Hawai'i Island milk.

Your comment, along with this response, will become part of the public record and will be published in the Final EIS. When published, the Final EIS will be available on the OEQC website which you can access using the following URL, and search "Hawai'i Dairy Farms": <http://tinyurl.com/OEQCKAUAI>.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.



Jeffrey H. Overton, AICP, LEED AP
Principal Planner

July 25, 2016

State of Hawaii – Department of Health

Laura McIntyre, Environmental Planning Office

919 Ala Moana Blvd., Room 312

Honolulu, HI 96814

Re: Hawaii Dairy Farms, Kauai

Doh.epo@doh.hawaii.gov

HDF@group70int.com

jim@hawaiidairyfarms.com

Comments to be considered in preparation of an Environmental Impact Statement for:

Project Name: Hawai'i Dairy Farms

Island: Kaua'i

District: Poipu

TMK: (4) 2-9-003:001 (portion); 006 (portion)

(4) 2-9-001:001 (portion)

Part 1 document of 3 documents

Aloha Ms. McIntyre:

I was underwhelmed by the response I received on my comments to the EISPN.

I received a form letter that was a cut and paste of the DEIS. It was my understanding that Hawaii Dairy Farms (HDF) and Group 70 were to respond on a question by question, comment by comment manner. (HEPA, January 2012 Section 343-5, HRS, mandates a 45- day comment period for a DEIS. The EIS is a more complex screening tool than either the exemption declaration or the EA to examine proposed actions for probable impacts on the environment. Accordingly, the process around an EIS is augmented with additional tools (beyond those used in the EA) to ensure that the document is distributed for and reviewed by agencies,

organizations and individuals, in a timely manner (see Section 11-200-21, HAR, concerning distribution of the draft and final EIS), and to further ensure that comments are responded to by the proposing agency or applicant in a point-by-point manner (see Section 11-200-22, HAR, concerning public review of an EIS). Section 11-200-17, HAR, prescribes the required contents of a DEIS, while Section 11-200-18, HAR, prescribes the contents of a FEIS. *Practice and Implementation of HEPA, January 2012*) What I received was far from a response to my individual questions. It was also filled with information I had not commented on because it was cut and paste. I was very disturbed when I opened the DEIS to see that my letter and Group 70's response were typed sideways and in font so small (7pt. font) so that they could put two pages on one page sideways. This made it so when you opened it up to read it on your computer you would have to use a magnifying glass and stand to the side of your computer screen with your head sideways. This posed even a more significant problem to one man that has recently gotten out of intensive care and could not physically stand with his head tilted sideways to read his response letter. These letters need to be properly done and redistributed to the community. The intent the writers of the DEIS had in making it difficult for the community to read the responses was not missed by myself or the community. If the attempt was to frustrate the community it was successful but it also infuriated the community and showed to us that HDF is anything but a good neighbor. The use of extraneous information, repetitive information and information spread out over different sections instead of being located together also did not go unnoticed. There were multiple places in the DEIS where the facts stated conflicted directly with information on other DEIS pages. The intent was clear.

I was not contacted and asked if I wanted a hard copy of the DEIS. I went to the personal expense to have it printed out. I did receive a CD with the report on it but most newer computers, like mine, no longer come with CD drives. I am sure HDF is aware of the discontinuation of CD drives. I was contacted by an ill gentleman, who could not use a computer to help him. I printed it out for him and mailed it to him at my expense. I made other hard copies available for citizen's that asked for hard copies for various reasons such as partial blindness. No braille copy was made available to my knowledge which placed the visually disabled at a disadvantage.

Hawaii's Environmental Policy Act – Citizen's Guide October 2014 - 6.3
Distribution, Page 19 "To avoid unnecessary printing costs, OEQC recommends contacting the parties identified in the distribution matrix to discuss whether a hard copy or electronic copy of the EIS is preferred."

I would still like answers to my questions. Let's start with the request to have all possible breaches being identified. Please identify them. Saying it won't happen is not sufficient. Saying it has never happened is 100 % inaccurate. Page 7 of your response to me stated "and no flooding events in the period following passages of the storms." In the letters sent to you by Mr. William Schimmelfennig reads:

"From: William Schimmelfennig [mailto:wshchads@hotmail.com] Sent: Monday, February 09, 2015 12:53 PM
To: EPO
Subject:

I've hunted in that valley back in the day and have seen that whole lower section under a foot plus of water. in the 80's, when I worked in the fire dept. we saw a huge waterfall coming off of Mount Haupu. That was on the Koloa end of that valley. Where do you think that water went but in the area where the dairy wants to be.

Submitted by, William Schimmelfennig"

Volume 1 page 70 states," Nonetheless, the storage pond design incorporates an emergency spillway to direct overflow to a secondary containment area in case of a cataclysmic event. This containment is beyond the regulatory requirement, and would only be utilized during an unprecedented rain or flood event. "There is no description as to how the secondary containment is made. What is to stop it from giving way under the weight of flood water? How is the water and contaminants removed from the secondary containment after a rain event? Is it to drain into the ground water and thusly our unconfined aquifer (per County of Kauai SWAP report)? The volume that is stated in the DEIS that this secondary containment is to hold, does this include the water from the rain event that will fall directly into it? Or is the true amount of breach containment less because of the direct rain?

Page 365 of volume 2 states, "Sluice gates emptying into the valley were found, but there were no associated ditches, suggesting the gates may have been placed there to deal with overflow or flooding, and not necessarily for the irrigation of a specific field."

**** In September 1996, there were six days of continuous rainfall, followed by a week of intermittent rainfall, bookended with another seven days of continuous rainfall. This event did create flooding in the valley as flash floods came down off Ha'upu. If the dairy were approved and constructed, such a significant rainfall event could cause the lagoons to fail and almost certainly to overflow, releasing substantial amounts of manure that will eventually flow and runoff into surface waters. I witnessed a rain event that lasted 45 days. Cars were floating all over the island. A major dam breached and failed killing eight people below it. (Plueger incident) This tragedy could happen again. HDF should not be in this location.**

This valley was once a swamp. It has a shallow water table and the soils are quickly saturated which will cause and has caused significant flooding. HDF should not be in this location. See attachment 1.0

These notations suggest strongly that flooding occurs and a real plan needs to be put in place. At the very least the consequences and impacts of a flood caused by a rain event should be studied and included with detailed a remediation plan. HDF should not be allowed to open a dairy in this location.

Vol. 2 page 19 (27 of 732)

“All of the water ditches on the property (and the ‘auwai around the margin of the valley floor) are coded “R4SBCx”, which represents: intermittent (seasonally **flooded**) flowing water, in an excavated channel.”

Page 116 of volume 1 reads:

“4.6.2 Impacts that would be considered significant related to natural hazards could include: • Damage to facilities or harm to personnel or livestock from natural hazards; and • Failure to anticipate and plan for protection of the dairy facility and operations from a natural hazard. “

****This appears to only take into consideration the dairy itself and not all that lives downstream from the dairy. This includes but is not limited to, fish, birds, humans, insects, seaweed, endangered species and the coral reef. The damage to these externalities would be a significant impact. You cannot ignore this significant impact, it will not go away. HDF should not be in this location.**

These same externalities are minimized in your DEIS when it considers the effect of the Phosphorous and nitrogen. Phosphorous in the stream and ocean will remove the available oxygen from the fish, water plants and coral. This is a significant impact as the stream already has phosphorous in it per USGS tests. See attachment 2. On page 304 of volume 2 it states that on Oct. 14, 2014 site 8 had a reading of 2.30. On Oct. 29, 2014 site 8 had a reading of 4.30, on May 8, 2015 site 8 had a reading of 3.89; phosphorous should be below 0.05 geomean to meet state standards. Based on your own tests the ditch/ stream is substantially over 0.05 How do you think it is possible for you to put any more phosphorous in the stream, even if HDF finally figured out how much it truthfully is going to discharge. HDF should not be in this location.

I find that there is conflicting information in your DEIS when it comes to the amount of phosphorous HDF intends to discharge. On page 151 of volume 1 it states that 1 % of the phosphorous will be discharged. On page 159 of volume 1 it states 900 pounds per year. On page 195 of volume 2 it states 3,695 pounds of phosphorous would be discharged. HDF should not be located here.

Another set of questions that went unanswered. What leads HDF to believe Grove Farms can supply them with 3 million gallons of water per day that they require to operate, When Grove Farms is not a utility company? Saying the water is going to come from your “allocation” of water doesn’t cut it. Who allocated it? Certainly not the people of Hawaii.

**** The Hawaii constitution in its Public Trust Doctrine states, “The State has an obligation to protect, control and regulate the use of Hawaii’s water resources for the benefit of its people.” It doesn’t read for the benefit of Grove Farms or HDF.**

Unanswered question: What will HDF do to get 3 million gallons of water per day when, as in Maui, the water is returned to its natural course?

Unanswered question: What size bond is HDF putting up for cleanup should a natural disaster happen? If there is no bond what is the rationale behind that when anyone who lives here knows it’s a matter of when?

Unanswered question: What will be done to protect the cows from the extreme heat (over 90) degrees and up to 104 degrees (per page 59 of HDF waste management plan) of the valley as there are no trees for them, only Norfolk pines lining the driveway? Over 150 trees were destroyed per Jim Garmatz deposition.

Unanswered question: What steps has HDF taken to keep soil from being washed into the stream during grubbing and grading?

****Mr. Moule of the Engineering Department of the County of Kauai wrote regarding the grading and grubbing requirements of Grading Ordinance 808. “HDF acknowledges that its grading and grubbing operations are to be conducted in accordance with County Grade Ordinance No. 808. Specific plans for best management practices will be implemented to minimize soil erosion and sedimentation.”**

And yet per Jim Garmatz testimony under oath in his deposition on page 78, “Q. Did you have **any** BMP’s in place related to the harrowing that you did on **any** of the acreage on the facility? A. NO.”

See number 3 attached testimony.

Unanswered question: How will HDF cleanup the stream before bringing cows? The Dept. of Health showed that in 2008 and 2010 readings for this area were in acceptable range.

Unanswered question: Please cite where you found the information that there were concerned citizens over the loss of Ag land that wanted Grove Farms site (HDF) protected under IAL? Grove Farm submitted the property for IAL designation after they were working with HDF.

Unanswered question: If an invasive species is already on Kauai, explain your thought process that more is better or alright to establish in respect to the Kikuyu grass?

****Especially in the light of the letter HDF and Ulupono received from NRCS stating that NRCS could not recommend the use of Kikuyu grass as it is a noxious weed on the HDF property? See attachment 4**

Unanswered question: Kikuyu grass is toxic to cows if they eat it down past a certain point, How is HDF going to monitor the grass so the cows aren't sickened? Does HDF even know this information?

Unanswered question: HDF states the quality of the land was studied during the designation process and was determined to be high quality land. How is that?

****The Garden Island Newspaper reported, "During Friday's hearing, the county of Kaua'i's Planning Department called into question the quality of the soil," also the NRCS soils Report for this specific piece of property states that this site is not good for an animal waste application.**

Unanswered question: The EISPN states that in September and October 2014 a waste management plan was reviewed by the DOH. Was the waste management plan approved by DOH? Your DEIS also states it was reviewed by DOH.

****Was HDF's Waste Management Plan APPROVED?**

Unanswered question: Aren't the cow raceways sloped so water will runoff and not destroy the integrity of the walkway? What is the distance from the edge of the walkway to the closest edge of the reopened drainage ditches that are connected to the Waiopili stream?

Unanswered question: Will manure and the urine from the cows twice a day trek to the milking barn be cleaned up off the walkways that are sloped to open ditches? Since the walkways are sloped should the 35-foot setback actually be extended to accommodate the pitch of the road directing the runoff off the road/ walkways?

Unanswered question: What was done to protect the receiving waters of the Waiopili stream and ocean during the cleaning out and reopening of the ditches from soil erosion?

Unanswered question: What will be done with the milk in the storage tank should the milk's temperature reach above 45 degrees? How will this affect the ditches, stream and the ocean? How many gallons of milk would this be if the storage tanks are completely filled?

Unanswered question: Before HDF gets approved for their operating permit from DOH won't HDF need to get approval from DNLR?

Unanswered question: Has HDF considered eliminating the settling pond and instead first removing all of the particulate from the wash down water, using a passive or automated incline screen followed by a continuous sand filter, like a Dynasand? If so why did you not explore this option as by using this process you would have a higher quality effluent to hold in the irrigation pond, making a flooding event considerably less damaging to the environment? For what reason would you not use a system that the solid waste would be dewatered at the source and easily used for composting or waste-to-energy? If this system was used with aeration of the pond then the odor would be minimized. Why would you not be a good neighbor and minimize the odor through this process? If you chose the CAFO alternative and used the Dynasand method then less water would be needed. Why not use less water?

Unanswered question: HDF talks about covering the effluent ponds when speaking with the community, why not commit?

Unanswered question: Why not consider using smaller multiple sites for your cows, when considering alternatives, this would be more environmentally sound? Is it all about the money or is the environment worth spending more money to protect it?

Unanswered question: What large land owners besides Grove Farms in the Hawaiian Islands have you contacted and taken a serious look at the feasibility of their sites? Would any of them be more protective of the environment? How many of the sites be more protective of the environment? If the sites were more protective, what was the rationale behind rejecting the sites?

Unanswered question: Do you believe the Important Agricultural Land designation with all its tax benefits was intended to help small farmers succeed and not for large profitable corporations? If that were the case that it was for large corporations, please explain to me why there was a bill in the house and one in the senate that would of limited the IAL benefits to the small farmer?

Unanswered question: HDF states in the EISPN that initial operations are permitted to begin with up to 699 cows. Where is the operating permit? Could you make a copy available to the community?

Unanswered question: What access will the community be allowed to the cultural sites? How are these sites to be protected from the effects of acid rain that is produced when hydrogen sulfide produced by the cows meets with rain? Please be specific.

Unanswered question: How often does the temperature in the valley exceed 86 degrees? What are the highest of the temperatures that exceed 86 degrees? How will the cows be protected during this extreme heat?

Unanswered question: How many times has the rainfall exceeded 50" per annum? When was the longest and most extended rainfall event recorded on Kauai? What major events happened during this time? How would this effect soil erosion in the valley?

Unanswered question: The EISPN states the average annual rainfall in Maha'ulepu is 50" why is this figure so different than the 60" to 100" mean annual precipitation cited in the 2014 NRCS Soils report?

Unanswered question: The EISPN states that during hurricanes, operational plans for safekeeping of the dairy's livestock will be identified in the Draft EIS. What about the enormous quantity of manure on the ground, how will that be protected from leaving the dairy during a hurricane that comes with torrential rains?

Unanswered question: What are the readings from the baseline air quality test? If HDF hasn't done a current air quality study before any cows come, why not?

Unanswered question: What are the noise readings from HDF baseline study? If HDF hasn't done a baseline study, why not?

Unanswered question: How many decimals is the bawling of a new mother cow when separated from her calf? How many decimals higher in terms of human hearing is the bawling at night when ambient sounds disappear? Based on HDF's plan approximately 333 cows will be separated from their new born calves every two months. What is the decimal reading of 333 cows bawling after being separated from their calves? How many days on average do mother cows bawl for their calves and how many hours per day on those days?

Unanswered question: How does the EPA level compare to the noise level of cows bawling?

Unanswered question: Will HDF have an air monitoring system on location? What type of system? How is it calibrated for accuracy? Who will be responsible for recording the readings and alerting the community and officials when it surpasses Hawaii's or EPA standards, will it be an unbiased person or an HDF employee? How often will the reading be reported to the community so as to alert community members with respiratory problems? What are the readings on the six pollutants for air quality established by EPA (NAAQS) that should not be exceeded? What will HDF do to resolve the problem of poor air quality if it should occur for each of the six pollutants? How will the farm workers be protected from air pollutants seeing as they would get the brunt of the pollution? What kind of health insurance will be provided for the workers?

Unanswered question: In regards to your irrigation system. What is the dimensions of the 2 pivots circles- radius etc.? How many wheel assemblies are there and what is the tonnage load per wheel section both empty and full? How are the certain ruts treated? What is the total mileage of the individual wheel section tracks? What are the specs re: slope climbing ability of the HDF pivot system? Where is it emptied out when transitioning between effluent spreading and irrigation use? What is the uniformity/spread certainty, error rate distance of the end gun system that HDF proposes? Rutting is a common problem with wheels/boons getting stuck. Will this create an over application of effluent? How is HDF going to deal with wheel rutting problems causing new ditches in which the water/effluent can flow into the stream?

Unanswered question: The plan that West Kauai Soil and Water Conservation approved in 2013 is no longer as that plan was unacceptable to DOH and a complete new plan(July 2014) has been adopted by HDF.

When is HDF going to submit the new plan for approval to the West Kauai Soil and Water Conservation? When called WKS WC knew nothing about a new plan nor they know about the review that was "in progress" as stated in the DEIS.

Unanswered question: What is the depth to Water Table for the soil (KavC) pod 159 of the burial pits? Are you planning on leaving 2 feet of soil above the water table before HDF buries a cow? Are you planning on spacing the dead cows 2 feet apart horizontally? HDF's

archaeologist said at the Feb 19th, 2014 meeting that the water table was at 3.5 feet deep. If you need to leave 2 feet above the water table that would only leave 18 inches. How wide are dead cows?

What are your calculations on how many dead cows you can bury In your cemetery? Where is HDF going to put them after the cemetery is full? Will the cemetery seep deteriorated matter to the nearby wetland on the property next door? What steps will be taken to stop possible seepage? Should there be seepage how would this impact the endangered and water birds? How is HDF going to stop the large rain runoff from coming down the mountain and floating up the dead cows?

Unanswered question: Where is the large depression referred to in the Kaua'i Reconnaissance Survey? Page 19 reads, "According to a state source, nēnē, koloa and other waterfowl frequent the taro lease land in Māhā'ulepū valley, and a broad natural depression in the valley that fills with water after heavy rain draws many waterbirds. Sixty koloa individuals were counted during one such event (Kaiakapu 2007)."

What is being done to protect it? This wetland has been identified by National Fisheries and wildlife services and is available on the internet. See attachment 5. This is also the marsh paddocks that the AIS draft identifies as paddock 135 to 137. See attachment 6 Jim Garmatz in his deposition identified this area as being flooded during rain event. And yet Tom Nance the hydrologist for Group 70 and HDF failed to find it. That puts his credibility into question. Why was he hiding it? Doesn't the fact that this area is being called a wetland and a marsh and flooded not denote that the water table is very shallow in this location. Also in the AIS the archeologist states that he hit the watertable in nine of his trenches that were all less than 5 feet deep.

Unanswered question: How will the Makauwahi cave that floods every couple of years, be protected from contaminated runoff from the HDF site? This contamination would include manure, urine, fertilizers, antibiotics, hormones and phosphorous and nitrates?

The Kauai Reconnaissance Survey states that it is hydrologically linked. Page 29 reads 'Though Māhā'ulepū valley's streams and wetlands were modified, their remnants remain; these expand and become especially visible during wetter periods. The former Wai'ōpili stream—largely subsumed by the ditch system within the cultivated area at Māhā'ulepū— emerges in more natural form near Makauwahi Cave at the south end of the study area, where it joins forces with a natural spring and a remnant of the once much larger Kapunakea Pond. This wetland juncture attracts waterbirds and serves as nursery habitat for native fish. It is linked hydrologically to the important Makauwahi Cave complex, a critical habitat for endangered arthropods"

Unanswered question: How is HDF going to protect the community from being bit by the biting flies while trying to enjoy the beach? How is HDF going to protect the community at large from biting flies?

Unanswered question: Will HDF be responsible for all medical bills, pain and suffering inflicted by the biting flies as a vector for disease? Have you studied the diseases caused by flies as a vector? Why not? Are you going to make the study available to the community at large?

Unanswered question: What is HDF going to do to protect the wetlands and nesting environments from becoming inundated with the invasive kikuyu grass causing the endangered species loss of their forage?

HDF was told by NRCS that they could not support the choice of Kikuyu grass. Kikuyu is a noxious weed per NRCS letter see attachment 4

Unanswered question: What will be done to protect the waterbirds, the Newell Shearwater, the migratory birds, the indigenous species, the terrestrial Invertebrates, the marine vertebrates, the reef fish, the arthropods and the seaweed that the local people gather? Please address these individually citing their habitat needs and how those are being protected? What will be done in the event of a breach to insure that these species are not desecrated? If a breach were to happen this would be a significant impact. HDF should not be located at this location.

Unanswered question: The social-economic impacts will be greatly significant. How much will house values drop within 5 miles of the dairy? Please denote these figures for every half mile increment.

Please do an accurate and professional social-economic study. Don't tell us that the values of our properties will go up because HDF is located close by. That is preposterous! As a former Real Estate Broker with appraisal credentials, telling the community their property values will go up because of proximity to HDF as you do in this DEIS is a bald face lie.

Unanswered question: How far can flies travel? Once a fly reaches another moist area, how far will it fly from there? How many larvae does each fly lay? What is the exponential number of flies after a year of the dairy opening if we start with one fly per cow (2,000 flies)? How will this affect homes with pools value within 5 miles of the dairy? As it is known that flies are attracted to swimming pools and barbecues.

Unanswered question: Many dairies purchase the homes that are impacted by their operations, how many will HDF purchase? How do we get HDF to purchase our homes?

Unanswered question: How far will the odor travel based on an average day's northeasterly or easterly wind speed of between 15-17mph? How will HDF protect the community including our Keiki and Kapuna from the gases and particulate produced in the air by the dairy? What about the community members that have compromised lungs?

Will HDF pay for their medical expenses if their conditions take a turn for the worst after the dairy is in?

Unanswered question: The EIS must study the impacts to the environment and study the potential impacts to the Poipu visitor economy which will be significantly impacted by the environmental consequences of such an intensive land use in the Maha'ulepu valley. How many jobs would be lost at the Hyatt because of odor and flies? The DEIS does not include a proper economic impact study. The information is severely lacking. Just because you say they will be no odor that will affect our homes doesn't make it so. Provide us with an expert study. The community is not stupid. Many have lived near or on dairies or at a minimum driven by one and could smell it at a distance. Telling us only 50 % of the people will be bothered by the smell is not comforting or acceptable.

Unanswered question: Does HDF plan on remunerating the Hyatt for lost business? What about the owners at Poipu Kai and other vacation rentals loss income?

Unanswered question: What will HDF do to address the impact of acid rain created by the off gassing of their cows? What about the archeological sites, how will the acid rain affect them?

I have more comments and questions that have arisen from reading the DEIS. Please answer these questions and respond to my comments in a question by question, comment by comment manner as required by HEPA 2012 (to further ensure that comments are responded to by the proposing agency or applicant in a point-by-point manner (see Section 11-200-22, HAR, concerning public review of an EIS).

Comments to DEIS on Volume 1

Volume 1 page 114 of 299

"However, natural variability in ocean circulation and atmosphere has allowed potentially destructive storms to reach Hawai'i from the east. Hurricanes Dot (1959), Iwa (1982), and Iniki (1992) all approached from the south and passed near Kaua'i."

**** This is a flagrant misrepresentation of the truth. The Environmental Assessment for Well F states "The work to prepare this Environmental Assessment and contract documents for exploratory well drilling and testing had been delayed two years due to Hurricane Iniki, which struck Kauai in September 1992."**

Vol 1 page 198 of 299

"The review of property values adjacent to beef cattle operations in the region reveals newer homes with large square footage in a luxury residential community with 2016 assessed values of \$1,297,150 for a lot, to \$2,893,100 for a lot with home. Clearly, beef cattle operations are compatible with nearby homes, commercial areas, resorts and recreational areas. The ranching and rural ambience adds to the value."

**** another flagrant misrepresentation. "In other similar situations, surrounding property values declined by 26% to as much as 88% as a result of these factory farms." Letter to Mayor Carvalho by John Kilpatrick, PHD, MAI. I would like to see at the minimum a study or two that site the effect on property values or an economist's report. I am a former Real Estate Broker with appraisal credentials. The values of homes in Koloa/Poipu will plummet which will start a cascading effect on revenue loss for the county of Kauai, who will in turn need to raise the property taxes on the other homes on the island to meet their budgeted expenses. The dairy will further affect the entire state when the 2600 plus employees on the south shore begin to lose their jobs and need to collect unemployment and many families around the island will file to receive welfare benefits.**

HDF Volume 1 DEIS pg 1-8 (pdf pg 26)

"As a safeguard, the HDF ponds will be sited within a secondary containment area, which provides greater backup containment capacity than called for under the regulatory requirements." HDF Volume 1 DEIS pg 1-8

***** what is the material used for the backup containment? Why will the waste water not travel through the material into the ditches and then the ocean?**

HDF Volume 1 DEIS pg 3-29 (pdf pg 81)

"...areas for nutrient application will be recently grazed paddocks that are in a regrowth period for approximately 18 days – a "rest" period for the paddocks, as the grass will require significant nutrient during its regrowth phase.

Soil moisture and the amount of precipitation will also determine the actual amount of both irrigation water and effluent to be applied in an application. Any deficit below field capacity determines the amount that can and may be applied. The frequency and number of heavy rain days will dictate the schedule of both irrigation water and effluent application. The maximum flow rate from the pump injecting the effluent from the storage pond is 320 gallons per minute (gpm). During the 48-hour cycle, roughly 0.12 inches of effluent water is applied via injection into the irrigation water to the center

pivot, as part of the 0.39 inches of total irrigation per cycle." HDF Volume 1 DEIS pg 3-29

******* 0.39 inches of total irrigation per cycle is higher than the Ksat indicated in the NRCS soils studies that was done for these soils on this site. This figure needs to be adjusted. It does not account for any rainfall which would also limit the amount of water/effluent that can be added to the soil.**

HDF Volume 1 DEIS pg 3-29 (pdf pg 81)

"The following liquid effluent setbacks are incorporated into the design to prevent application of effluent within the distance specified below:

- County Well Kōlo'a F – 1,000 feet on all sides (through County DOW agreement)
- Irrigation ditch, agricultural water, and natural water resource - 50 feet from top of bank of the water resource on both sides.
- Cow walkways and races - 6 feet on both sides
- Existing taro farm - 20 feet on all sides

The setback distances from water resources are based upon requirements contained within the "Guidelines for Livestock Waste Management", by University of Hawai'i Mānoa, College of Tropical Agriculture and Human Resources (CTAHR)." HDF Volume 1 DEIS pg 3-29

****** One of the raceways parallels in a ditch/stream but if the setback is only 6 feet from the raceway then it would not be far enough away from the ditch/ stream. This can easily be seen by how close the ditch/stream is to the raceway near the Taro field. At the taro field the ditch/stream is open and readily seen, but goes underground it runs east. What is to keep the Manure and urine that are dropped by the cows from entering into the stream/ ditch as they walk down the raceway?**

HDF Volume 1 DEIS pg 1-10 (pdf pg 28)

"...thatch, nutrients are incorporated into what is effectively an organic net. Due to the high moisture and moderate temperatures, the microbial activity in the thatch is very high and the excreted manure and effluent will be largely broken down by microbial activity within 24 hours. Microbes such as bacteria, protists, and fungi will break down the manure and effluent through decomposition into its nutrient components to make these readily available for uptake into the grass crop and plant matter. Even with the applied manure and effluent nutrients," HDF Volume 1 DEIS pg 1-10

***** break down of manure in 24 hours...fantastic break through! Then why do you need dung beetles?**

HDF Volume 1 DEIS pg 1-14 (pdf pg 32)

"With the dairy in operation, during periodic seasonal storm water runoff events (about 10 times/yr) there may be additional nutrients introduced to the agricultural ditches, which ultimately drain to the nearshore ocean water. The findings of the water quality evaluations are presented in Sections 4.16, 4.17 4.22 and 4.23. The complete studies are presented in Appendix E and Appendix F." HDF Volume 1 DEIS pg 1-14

** Seasonal storms only 10 times a year yet Vol. 2 page 92 states, "It is estimated there will be 7 to 8 days a year in which rainfall derived runoff will occur (TNWRE 2016)" So more inaccuracies for the community to deal with in our comments. Which of these statements on your part are true?

HDF Volume 1 DEIS pg 1-14 (pdf pg 32)

"There is also the potential for vector insects such as flies to become established at the dairy farm, controlled by Integrated Pest Management measures. The findings of the manure-related insect study are presented in Section 4.11, and the complete study is presented in Appendix B. Air quality in the immediate vicinity of the dairy farm (within 1,700 feet) may, in the worst-case conditions, be affected with odors from the effluent pond and manure in the pasture paddocks. The findings of the air quality odor model are presented in Sections 4.19 and 4.25, and the complete study is presented" HDF Volume 1 DEIS pg 1-14

**Only stinks 1,700 feet. A bit more than the 50 feet Amy stated at the public meeting.

***CAFOs uncovered: the untold costs of confined animal feeding operations"; Cambridge, MA : Union of Concerned Scientists, 2008. Doug Gurian-Sherman; Union of Concerned Scientists. Page 60 states "Adverse effects are often significant at distances of up to two or three miles from CAFOs, and become more severe as operation size increases. One study in particular noted a strong correlation between the types of symptoms reported by residents and those studied in CAFO workers, especially respiratory and gastrointestinal distress, strongly suggesting that CAFOs were the cause (Wing and Wolf 2000)."

HDF Volume 1 DEIS pg 1-16 (pdf pg 34)

"It is anticipated that the HDF dairy herd can be increased well beyond 1,000 to 1,500 milking cows and be sustainable from an operational and environmental perspective. Expansion beyond the 699 milking cows level will require issuance of a CAFO/NPDES permit by the State Dept of Health. With careful monitoring of the operations and the natural systems, including the soils, pasture grasses and water quality, the dairy scaling can be accomplished with sensitivity to the various indicators of carrying capacity. The potential for HDF to reach the upper scale of 2,000 milking cows at the dairy may or may not ultimately occur, depending upon the operational sensitivities and the indicators..."

HDF Volume 1 DEIS pg 1-16 (pdf pg 34)

***Why doesn't HDF get a NPDES for the 699 cows so as to be a good neighbor?

HDF Volume 1 DEIS pg 2-8 (pdf pg 48)

"After significant research and inquiry, New Zealand's grass-fed model was found to be the cleanest, most cost effective method for sustainable dairy production in Hawai'i."

HDF Volume 1 DEIS pg 2-8 **This is another contradiction in this DEIS as other parts of the DEIS site other models. So which model are you truthfully using?

HDF Volume 1 DEIS pg 2-9 (pdf pg 49)

"For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process

for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation." HDF Volume 1 DEIS pg 2-9

** I do not believe this DEIS should be used for the larger capacity of more than 699 cows as by time that would happen there will be more information available to inform our comments and the decision making process of the DOH.

HDF Volume 1 DEIS pg 3-2 (pdf pg 54)

"...floor grazed by cattle from 2002 to 2013. Approximately 400 – 500 head of beef cattle were shifted off the valley floor to surrounding properties upon HDF's lease. Taro cultivation was introduced on an adjacent parcel in 2007 when landowner Grove Farm offered small parcels with access to water to individual farmers in an effort to establish an agricultural park of varied users. The land was originally owned by Grove Farm and Visionary, LLC (Lihue Land Company) and transferred to Mahaulepu Farm LLC in 2011." HDF Volume 1 DEIS pg 3-2

** Who had 400 to 500 head in the valley, was this at one time? Certainly not the Palama family. What is a shame is that because of HDF wanting the property, the small farmers that were in the valley were displaced. It is further a pity that because the small farmers are only given a month to month lease by Grove Farm dba Maha'ulepu Farm LLC the effect of which is the banks won't make them small loans as they can so easily be displaced. Why would HDF, Maha'ulepu LLC, Grove Farm create such an Environmental Injustice. Many of these small farmers will not speak of this injustice as they are afraid of retaliation by Grove Farms.

HDF Volume 1 DEIS pg 3-2 (pdf pg 54)

"The nearest populated area to Māhā'ulepū Valley is the Kōloa town community; residences closest to the site are 2.3 miles west. Kōloa town has its roots firmly tied to the agricultural history of the region. The resort area of Po'ipū began with oceanfront resort hotel development in the 1960s. During the 1970s and 1980s, agricultural lands in the Po'ipū area were reclassified from State Agricultural District to Urban District, and rezoned by the County as resort. The Grand Hyatt Kaua'i is the closest resort to the dairy site, with 1.6 miles between the property boundaries. Significant expansion along this coastline occurred from 1980 to present, with active development of hotels, timeshare condominiums, single-family resort residences, golf courses and commercial centers." HDF Volume 1 DEIS pg 3-2

**The nearest populated area isn't 2.3 miles west. The Gillian House is less than a mile. Did you forget? Poipu Aina, where there are multiple homes, is less than 2 miles, Did you forget?

HDF Volume 1 DEIS pg 3-7 (pdf pg 59)

"Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in

2013. Additional practices, including but not limited to those shown above, are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices." HDF Volume 1 DEIS pg 3-7

****Your representation to USACE was falsified from what you actually did on the property. Falsified like the falsified information on HDF's NOI application. Per Jim Garmatz testimony under oath. See attachment 7 of deposition pages 227**

HDF Volume 1 DEIS pg 3-10 (pdf pg 62)

"...roughly 21 square feet per calf, and are divided into a feeding area and a bedding area." HDF Volume 1 DEIS pg 3-10

****That's crowded, that's about 4 feet by 5 feet to eat, sleep, defecate and exercise. Does this qualify as animal abuse? How often is the manure removed from these small pens?**

HDF Volume 1 DEIS pg 3-12 (pdf pg 64)

"Potable water is required for milk cooling, livestock consumption, and consumption within the dairy facility, as well as to supply wash water to maintain animal health and sanitation of the milking parlor, holding yards and calf sheds. State of Hawai'i Department of Health (DOH) Milk Rules require potable water used for milk production – in the milking parlor and for milking operations - be from an approved supply that is properly located, protected, and operated in a sanitary manner." HDF Volume 1 DEIS pg 3-12

****What will the setback be around wells 14 to protect them from contamination?**

HDF Volume 1 DEIS pg 3-18 (pdf pg 70)

"Should animals die at the site, they will be buried at a designated area, following plans for carcass management as specified in the Waste Management Plan reviewed by DOH." HDF Volume 1 DEIS pg 3-18

****This is not adequate information about the burial of cows or about the cemetery other than it is on paddock 163. At a bare minimum the Waste Management Plan should be attached.**

****How is burial being handled? How many cows will HDF bury per month? Per year? How many pounds of decaying flesh would this be? How deep is the ground water at this location? How is the ground water to be protected? How is the surface water to runoff of paddock 163? How deep will the cemetery be? How long and how wide and how deep will the cemetery be the first year? The fifth year? The twentieth year? How will you know if the ground water swells upward during the raining season and infiltrates the buried decaying flesh and bacteria, contaminates and pathogens? How deep is the ground water in paddock 163. Does paddock 163 have any slope to it? What will the impact be on the neighboring wetlands down slope from paddock 163 during the rainy season? How will the endangered species environment be protected from a 25-year 24-hour rain event hits the cemetery and creates huge runoff into the drainage ditches, neighboring wetlands and the streams located nearby? How is the runoff from the mountainside right behind paddock 163 not going to saturate the disturbed ground in the cemetery and make the carcasses float? There are pictures that show the route**

rainfall takes down the mountainside to paddock 163. These pictures clearly show no vegetation growing on the mountainside pathway because of the continual rain runoff. ** Why isn't the cemetery included in cumulative impacts? Hundreds or thousands of dead cows have a significant impact and over the years of burying cows on the site would have a horrific impact.

HDF Volume 1 DEIS pg 3-15 (pdf pg 67)



****Figure 3.3-5 shows a stream of water coming down the mountainside close to the animal cemetery. Figure 3.3-5 included in the DEIS is incorrect as it is the old map from the EISPN. It is incorrect as it doesn't show the 1,000 foot setback from well F that this report speaks of being in existence. Another inconsistency within the DEIS.**

HDF Volume 1 DEIS pg 1-8 (pdf pg 26)

"Storm Water Drainage. Gutters, curbs and swales will direct surface sheet flow. Metal roofing material on dairy buildings will be sloped to adequately sized gutters and downspouts." HDF Volume 1 DEIS pg 1-8

****What size are "adequately sized gutters? How was this determined? "Adequately" is not a scientific term. Adequately sized gutters and downspouts is not quantitative. It is unacceptable in a DEIS to use such vague terms and generalizations. Often the gutters and downspouts are overwhelmed by heavy rainfall. How will this be handled? Is it calculated into the effluent pond size as it will be impossible for the water to be directed as stated?**

HDF Volume 1 DEIS pg 4-56 (pdf pg 148)

"Groundwater Source Protection

...potential contamination activities (Spengler, 2014).

The SWAP delineated three zones of contribution referred to as capture zone delineations (CZD) for all public drinking water sources in the State of Hawai'i based on groundwater time-of-travel (TOT) criteria (Whittier and El-Kadi, 2014). The initial zone, Zone A, is the "well control site" zone and consists of a 50-meter diameter around each well. The second CZD, Zone B, delineates the 2-year TOT, which relates to conservative survival times for bacteria and viruses in soil and groundwater. The third CZD, Zone C, delineates the 10-year TOT, which would allow sufficient time to implement management and remedial measures to mitigate contamination from accidental contamination spills or other causes (Whittier, 2010)." HDF Volume 1 DEIS pg 4-5

** The DEIS leaves out "Environmental Protection Agency (EPA) and with existing assessment and protection efforts in Hawai'i (Whittier et al., 2010). The SWAP process involved: (1) delineation of the area around a drinking water source through which contaminants may travel to the water supply; (2) inventory for potential activities that may release microbiological or chemical contaminants within the delineated area; and (3) determination of the drinking water source susceptibility to surrounding potential contamination activities (Spengler, 2014)."

**The DEIS ignores #2. As dairies are listed as highest risk. #2 should not have been skirted. This table from (Whittier, 2010) shows lagoons as high risk.

Table 1 Listing of data sources and scoring for potential contaminating activities

PCA name **PCA type**

Lagoons/liquid wastes **High**

Additional buffer zone can be used to delineate a larger setback away from activities that may be significant potential sources of contamination (e.g., land-fills or hazardous material disposal sites), and to provide additional information that may be helpful for longer-term planning.

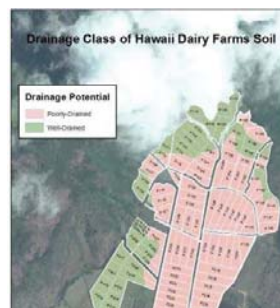
"The Islands of Hawaii are characterized by high rainfall and highly permeable aquifers." (Whittier 2010)

Aquifer sensitivity takes into account the vulnerability of the aquifer based on the hydrogeologic setting of the aquifer as defined by Mink and Lau (1990). Among other factors, aquifers were classified according to vulnerability to contamination. The aquifer sensitivity attribute in the current study was based upon such vulnerability, and was rated as high, moderate, and low and is reported for each source in the final report." Whittier 2010)

Groundwater sources provide about 99% of Hawaii's public water use and 50% of all freshwater used in the state (Gingerich and Oki 2000). At the time of this study, the groundwater comprised 405 sources out of 453 total sources. The rest is served by surface-water sources and groundwater sources under the direct influence of surface water such as spring sources and water-development tunnels. (Whittier, 2010)

What you should be looking at is the specific report for Kauai Well F, Well D and Well C that are all listed in the "Source Water Assessment Program" report for Kauai. This report sites these wells as being at HIGH risk for contamination. It also states the aquifer is UNCONFINED and the wells are IRREPLACEABLE. Why don't you refer to this report instead of the one you do that is on the island of Oahu??? See attachment 8

HDF Volume 1 DEIS pg 4-57 (pdf pg 149)



***** If you compare the map from Vol 2 page 109 to the Kauai County Water Assessment map, it becomes apparent that the well draining soils which the DEIS states, "This report indicates that the amounts of soil water that can move from the soil surface into underlying groundwater is minimal when the dairy land is irrigated and manure effluents are applied."



"Figure 4.16-2 County Well Head Capture Zone Delineation" HDF Volume 1 DEIS pg 4-57

** The above maps show that the well-draining soil is in fact in Well F's capture zone C. This would mean that it is a high risk well with manure, a high risk substance being spread in its capture zone and the lagoons (high risk) are located next to the capture zone to recharge our drinking water well. The most this DEIS is willing to admit is that "the amounts of soil water can move from the soil surface into the underlying groundwater is minimal when the dairy land is irrigated and manure effluents are applied." What about the manure left on the soil in the capture zone by the cows directly?

HDF Volume 1 DEIS pg 4-109 (pdf pg 201)

"SUMMARY OF PROBABLE IMPACTS

Proposed Action - Committed Herd Size:

699 milking cows"

"CUMULATIVE IMPACTS"

"The development and operation of the pasture based dairy will be combined with impacts associated with anticipated future developments in the Poipu and Koloa region. With mitigation, there will be limited short term impacts such as soil erosion, dust, worker traffic and vehicle emissions. Long-term cumulative effects will include limited soil erosion, storm water runoff, groundwater use, nutrient contributions to agricultural ditches, worker vehicle traffic, and air emissions. Odors will be contained within the dairy and limited adjacent farms. In addition to injected wastewater nutrients entering the nearshore ocean waters generated by the Po'ipū resorts and residential areas, there will be minor amounts of nutrients contributed from the pasture-based dairy. The dairy will provide net economic benefits, adding to the agricultural economy of Kaua'i."

HDF Volume 1 DEIS pg 6-24

** Just because the stream is polluted does not mean HDF can start to add more pollution. Storm water runoff will definitely pollute the Waiopili stream and the ocean as any storm water must run off the pastures that are laden with manure left by the cows. What is your substantiation for the claim that odors will be contained within the dairy? There is no expert odor study in this DEIS. How is HDF going to stop the winds from blowing the odor into Koloa and Poipu?

HDF Volume 1 DEIS pg 6-24 (pdf pg 276)

CUMULATIVE IMPACTS

"The no-action alternative generally would not contribute to cumulative impacts. Grazing operations without mitigation controls would add to soils erosion, nutrients in storm runoff. Depending upon the herd size, the grazing operation could generate potential odors."

** This is an inaccurate description of the no alternative. Many of the farmers that were displaced by HDF were farming vegetables. There is nothing saying that this area would only be used for grazing. The Hawaiians used it to grow taro and sweet potato. The land was also covered in sugar cane for many years. You need to address the no alternative from that prospective. Please redo this section.

Volume 1 DEIS pg 6-24 (pdf pg 276)

"The effects associated with the development and operation of a feedlot confined dairy would combine with impacts associated with anticipated future developments in the Poipu and Koloa region. With mitigation, there would be limited short term impacts such as soil erosion, dust, worker traffic and vehicle emissions. Less land would be committed with minimal pasture area. Long-term cumulative effects would include limited soil erosion, storm water runoff, groundwater use, nutrient contributions to agricultural ditches, worker vehicle traffic, and air emissions. Odors would likely extend into the resort community. In addition to injected wastewater nutrients entering the nearshore ocean waters generated by the Poipu resorts and residential areas, there will be comparatively greater amounts of nutrients contributed from the pasture-based dairy. The feedlot dairy will provide net economic benefits, adding to the agricultural economy of Kaua'i."

****If the cows were housed in a building the ability to clean up after the cows and to process and transport the manure to farms where it would be needed would aid in the reduction of odor and flies. Nutrients that are not sprayed on the field can not runoff. The cows would not be swept away in a flash flood, that has occurred in the past."**

Volume 1 DEIS pg 6-24 (pdf pg 276)

"Odors will be contained within the dairy and limited adjacent farms. There would be minor nutrients contributions from the pasture-based dairy to Hulē'ia Stream."

****What about the Waiopili Stream, the one that receives water from the dairy? It appears this report was done by someone that doesn't know Kauai nor knows the site. Volume 2 page 280 states, "Surface waters draining the project site meet Waiopili Ditch, and will eventually reach the ocean." Of course, the person who wrote this piece is referring to a stream as a ditch. When in fact, it was a stream that crossed the dairy site but was turned into a ditch/drain in order to drain the water from what was a "swamp" at the time." See attachment 1 (swamp map) and attachment 9 (proposed drain map 1897)**

Volume 1 DEIS pg 6-24 (pdf pg 276)

"Odor conditions at the pasture-based dairy will be limited within the dairy project area and immediate vicinity. In the worst-case meteorological conditions, odor may reach approximately 1,670 feet south of the HDF southern boundary. There are no homes or resort facilities in this area. The odors will not reach resort or residential communities. For the area within the modeled odor isopleth, odor may be detectable by 50 percent of the population at a frequency of once every 200 hours, or roughly 44 hours per year."

****This statement contradicts itself. Your odor model is sorely lacking. There is a home within 1670 feet of the dairy site! So your statement is false. The statement that states, "odor may be detectable by 50 percent of the population at a frequency of once every 200 hours, or roughly 44 hours per year" is unacceptable as Poipu Kai, the closest community, is primarily older retired people. The odor will carry with it particulate, pathogens, bacteria, super bacteria such as MRSA and sulfides. These will have a**

significant impact on the elderly community whose immune systems are compromised. The Dairy must not be located near elderly. This is the wrong location for this dairy.

Volume 1 DEIS pg 6-23 (pdf pg 275)

"Episodic, seasonal rainfall events (~10 days/yr.) cause groundwater in the alluvium to rise and intersect with the agricultural ditches and groundwater containing nutrients."

**** "Ground water under the direct influence of surface water" per the Island of Kauai Source Water Assessment Program report, states that the entire watershed must be considered as providing recharge water to the drinking water wells. (GWUDI) What analysis or calculations have you done to determine the volume of nitrogen, phosphorus, sulfides, pathogens and bacteria that would move through the groundwater to recharge our drinking water wells taking into account the entire watershed which includes all of the dairy site?**

Volume 1 DEIS pg 6-23 (pdf pg 275)

"HDF will release an estimated 10,000 pounds of nitrogen and 900 pounds of phosphorus annually. Contributions of nutrients from episodic rainfall (10 days/yr) will not adversely affect ocean water quality and the marine environment."

****Once again this statement is full of inconsistencies when the rest of the DEIS is taken into account. On page 70 of volume 2 (pdf pg 192 of 732) it shows an excess of 3,695 pounds of phosphorus that will runoff. Page 4 of volume 2 (pdf page 92 of 732) reads, "It is estimated there will be 7 to 8 days a year in which rainfall derived runoff will occur (TNWRE 2016) You are making Tom Nance look like he doesn't know what he is talking about in his report. Is it 7 to 8 or 10 days? How can you tell how much phosphorus will run off if you don't even how many days you will have runoff?**

HDF Volume 1 DEIS pg 6-23 (pdf pg 275)

"SURFACE WATER RESOURCES ENVIRONMENTAL RESOURCE PROPOSED ACTION (699 COWS)

"Over 120 wastewater treatment injection wells serving resort development in Po'ipū. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the potential HDF nutrient throughput. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF."

HDF Volume 1 DEIS pg 6-23

*****so if 75% of all the people, tourists and residents of Koloa and Poipu lived on the farm site and all the golf courses and yards were stacked up on the farm area it would produce the same amount of phosphorus as the dairy will produce. This is not comforting. So if some nitrogen and phosphorus is bad, more is not better but worse.**

HDF Volume 1 DEIS pg 6-23 (pdf pg 275)

"State DOH surveys and environmental sampling/testing programs have identified high levels of enterococci bacteria in the agricultural ditches, particularly near the terminus of the ditch near the ocean. State standards apply to recreational waters, and the ditch is not utilized recreationally by bathers."

** If that is the case then why do they need to lock the gate to keep people out while they survey the area? Also why do I have multiple pictures of children playing in the stream, which I personally delivered to Dr. Virginia Pressler head of DOH. But the DEIS refers to the water as "nearshore recreation waters at the terminus of Waiopili Ditch" in Vol. 1 pg 4-62.

The Kauai South Shore Community plan includes this chart in their plan. Maha'ulepu appears to have more than enough people and uses to qualify as "Recreational Waters"

Location	Swimming	Fishing	Boating	Surfing	Snorkeling	Scuba Diving	Canoeing	Kayaking	Jet Skiing	Water Skiing	Parasailing	Paragliding	Hang Gliding	Other
Māhā'ulepū Bay	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Maui (Prince Kuhua)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kaunohā'uli (Kāne'ohe Golf Village Site)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kaunohā'uli Bay (Shipyard or Pā'ia Beach)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kaunohā'uli (Maui Point to Kaunohā'uli Bay)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Maui	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kaunohā'uli, Kāne'ohe Forest Reserve	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kaunohā'uli (Maui Point)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Maui Reserve	X	X	X	X	X	X	X	X	X	X	X	X	X	X



DEIS Vol. 1 page 4-108 & 6-23 (pdf page 200) "Over the long-term, the surface water quality in the agricultural ditches and Waiopili Ditch will be improved by active management of the dairy site. The dairy site represents roughly 20 percent of the 2,700-acre Māhā'ulepū Valley sub-watershed, and soil erosion from the HDF site will be reduced by establishment of thick grass ground cover and maintenance of vegetative buffers totaling 70 feet in width – 35 feet on either side of the agricultural drainage ways." HDF Volume 1 DEIS pg 4-108 and 6-23

**There is soil erosion into the Waiopili from the HDF site. This violates the Clean Water Act. Jim Garmatz testified that HDF cleared the 580 acres per his testimony page 75. He also testified that he did not use Best Management practices. Per page 78 of his testimony. Attachment 10 is a picture of HDFs no using BMP, there isn't any vegetative buffer shown.

" HDF Volume 1 DEIS pg 4-108 and 6-23 (pdf pg 200 and 275)
DEIS pg 4-108 and 6-23 (pdf pg 200 and 275)



Attachment 10 No Best Management Practices used

HDF Volume 1 DEIS pg 6-22 (pdf pg 274)

"Water will come from a non-municipal source: either the on-site deep wells; or from the HDF allocation from Waita Reservoir."

HDF Volume 1 DEIS pg 6-22

****Who is allocating Public Trust Doctrine water? The Public Trust doctrine states, " All public and natural resources are held in trust by the State for the benefit of the people." It doesn't read for HDF's benefit or the benefit of Grove Farms or Maha'ulepu LLC. "For the benefit of present and future generations, the State and its political subdivisions shall conserve and protect Hawaii's natural beauty and all natural resources, including land, water, air minerals and energy sources, and shall promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of the self-sufficiency of the State."**

HDF Volume 1 DEIS pg 6-22 (pdf pg 274)

"The no-action alternative would have limited to no effect on groundwater resources. A small portion of nutrients resulting from cattle/sheep manure break- down in pasture areas will enter shallow groundwater." HDF Volume 1 DEIS pg 6-22

******A small portion is not a quantitative amount. This also assumes cattle and sheep will be there what if they are not there? Faulty premise. It could be compared with**

growing hemp or kalo, not cattle. Hemp cleans up the environment and uses less of the community's water.

HDF Volume 1 DEIS pg 6-18 (pdf pg 270)

"Alternative Location...UNSUITABLE Site not designated as IAL" HDF Volume 1 DEIS pg 6-18

**** It is my understanding that alternative sites were to be compared regardless of cost. IAL establishes a financial benefit.**

HDF Volume 1 DEIS pg 6-15 (pdf pg 267)

"Note: Since this alternative location was evaluated in 2015, the land has been contracted for sale to another landowner who is not planning to develop a pasture-based dairy.)" HDF Volume 1 DEIS pg 6-15

**** Then this isn't an actual alternative and Group 70 needs to identify one. At one of their early public meetings HDF stated they would have preferred this sold site over the Maha'ulepu site but it had sold. This meeting was held before the EIS was announced. Your time frames are wrong! It must have been a better location for HDF's needs. There is no consideration of land on other islands or other large landowners.**

HDF Volume 1 DEIS pg 4-22 (pdf pg 114)

"With the discontinuation of sugarcane cultivation in 1996, culverts and ditches in the valley became impacted with sediments and vegetation. During periods of high rainfall, reduced capacity caused Waiopili Ditch to be overwhelmed and storm water was reported flowing across Māhā'ulepū Road. Since leasing the site, HDF has worked with the landowner, Mahaulepu Farm, to remove sediments and restore capacity to the ditches. Calculations of rainfall runoff show sufficient drainage capacity in the ditches when maintained with minimal sediment build-up."

HDF Volume 1 DEIS pg 4-22

****So what this suggests is that Maha'ulepu Farm was also aware of the lack of Best Management Practices. Maha'ulepu Farms as the landowner is as culpable as HDF for the discharge of sediment to the ocean via the stream and for lack of Best Management Practices. Did they inform HDF that they needed to use BMP's.**

HDF Volume 1 DEIS pg 4-22 (pdf pg 114)

"Historical hurricane paths over the central Pacific show a typical pattern passing to the south of the Hawaiian Islands, with a maximum hurricane occurrence during the late summer when the ocean surface is warmest. Storms that approach the Hawaiian Islands from the east have historically weakened east of Hawai'i under the combined influence of unfavorable westerly wind conditions, resulting in large wind shear and cooler sea-surface temperatures. However, natural variability in ocean circulation and atmosphere has allowed potentially destructive storms to reach Hawai'i from the east. Hurricanes Dot (1959), Iwa (1982), and Iniki (1992) all approached from the south **and passed near Kaua'i**. This unusual track requires a breakdown of the semi-permanent ridge of high pressure to the north of the islands, which occurs when a trough of low pressure approaches the island chain from the northwest. Such troughs are generally confined to higher latitudes, except in winter."

HDF Volume 1 DEIS pg 4-22

**** Another false statement. The EA that the County of Kauai did before drilling well F states, "Hurricane Iniki struck Kauai"**

HDF Volume 1 DEIS pg 4-23 (pdf pg 115)

"Although they occur infrequently, Kaua'i has received a greater amount of damage from hurricanes..."

**** Iniki made landfall in Maha'ulepu/ Poipu area! It did \$3.04 billion of damage to Kauai. Hurricane Dot made landfall on Kauai. Reconnaissance flight determined that hurricane Dot had an unusually large eye, ranging between 35 and 40 miles in diameter. This would mean the cows and their manure would be in the eye of the hurricane. Hurricane Iwa had sustained winds averaged 60 to 75 mph and sustained rain.**

HDF Volume 1 DEIS pg 4-25 (pdf pg 117)

"No short-term significant impacts are anticipated related to natural hazards.

Short-term Impacts and Mitigation – Natural Hazards

Geologic and potential natural hazards pose no major constraints to the project."

****Untrue in both Iniki and Dot the cows would have been picked up by the eye. There is insufficient evidence to support the DEIS conclusion. The DEIS must prove that there is no impact not just say so.**

"An emergency preparedness plan for protection of animals has been prepared for HDF internal use. Construction design will meet IBC standards with local amendments."

"Emergency management procedures and staff training for emergency events will be in place to implement prevention and mitigation should natural hazards occur in the region that may impact the dairy herd or facilities." HDF Volume 1 DEIS pg 4-25

**** Why is this plan not included in the DEIS?**

HDF Volume 1 DEIS pg 5-10 (pdf pg 214)

"Discussion: The project is a balanced development proposal that is compatible to existing uses and relationships in the Māhā'ulepū agricultural region, and measures to protect water resources and water quality are presented in EIS Sections 4.16, 4.17, 4.23 and 4.24. While the project supports the County's initiatives for shoreline and marine environment protection and conservation, the project is located over one mile inland of the coastline, and does not have any shoreline or marine features." HDF Volume 1 DEIS pg 5-10

****The measuring of distance in this report is deceptive as it is done from the milking shed not the boundary of the site. The Milking shed might be over a mile but the pastures and cows aren't over one mile.**

HDF Volume 1 DEIS pg 4-6 (pdf pg 98)

"Terrain within the dairy typically slopes from 2 to 15 percent, which is the gentle slope required for the..." HDF Volume 1 DEIS pg 4-6

****This contradicts HDF Volume 1 DEIS pg 6-14 that reads "Māhā'ulepū Valley, Mostly 0-5% Slopes Generally Level" It also contradicts HDF's Storm water application that reads, 0 to 3%. So which is it? These inconsistencies continue throughout the DEIS. This DEIS should be returned to Group 70 as inadequate.**

HDF Volume 1 DEIS pg 4-44 (pdf pg 136)

"Long-term Impacts and Mitigation – Noise"

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Equipment will typically be used during daylight hours. Dairy operations will comply with applicable noise control ordinances. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Maximum permissible sound levels apply to any point at or beyond the property line, and are not to be exceeded more than 10 percent of the time within any 20 minute period. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region."

HDF Volume 1 DEIS pg 4-44

**** What is the dBA of a cow giving birth or crying for her calf? Noise at night carries further than during the day when there are other ambient noises. Is the noise level at the boundary of the site or at the milking shed where most of the measurements are taken from?**

HDF Volume 1 DEIS pg 4-49 (pdf pg 141)

"With the demise of sugar and seed crops in Kōloa and Po'ipū, the cattle grazing for the beef market is now the dominant use of agricultural land in the region. Grazing lands to the east, north and west of Kōloa total over 2,900 acres, which is reduced from over 3,300 acres before Māhā'ulepū Valley was leased by HDF. In the near term, grazing is likely to expand onto most of the lands used recently for seed crops. In Kōloa and Po'ipū, grazing occurs less than 200 feet from some homes, less than 1 mile from some visitor units, less than one-third of mile to the east and west of the main commercial area of Kōloa, and less than 200 feet from a golf course.

Many of the homes in the region that are near cattle operations are in the northeast and eastern sections of Kōloa; most of the homes were built before 1980 and are of modest size (less than 1,200 square feet). For these homes, the 2016 median assessed values ranged from \$406,100 to \$567,500. At the western end of Po'ipū is Kukui'ula—a luxury residential community that abuts grazing land. Most of the homes are newer, built after 2012, and most are large at over 2,100 square feet. For 2016, median assessed values of these residential lots and homes ranged from \$1,297,150 for a lot, to \$2,893,100 for a lot with home." HDF Volume 1 DEIS pg 4-49

****Why do you not go into the large differences between dairy cows and grazing beef cows? These items should be considered: use of potable water to wash the udders and clean the facilities every few hours? More urine and manure, more noise, flies etc. especially given the concentrated amount of cows in such a small area. Dairy cows produce substantially more manure and urine than beef cows. Also how many acres are these grazing cattle occupying? Density makes a huge difference. What do the ranchers with grazing cattle do with their mortalities, bury them upstream from the ocean below a mountain with substantial runoff?**

HDF Volume 1 DEIS pg 4-50 (pdf pg 142)

"Construction of the facilities at HDF would contribute approximately \$9.1 million per year during the development phase. This includes direct equipment and construction expenditures, and indirect sales related to construction.

In addition to the creation of an average of 12 construction worker jobs during the estimated construction period, the State of Hawai'i and County of Kaua'i will receive excise tax revenues on finished development and building materials, conveyance taxes, and income taxes on wages. Revenues from development activities to the State is estimated at \$650,000, with revenue offset by a tax credit for improvements on lands designated IAL. County revenue derived from development will be negligible." HDF Volume 1 DEIS pg 4-50

**** \$51,000 is not enough to even begin to clean up the mess after the first rain event. It probably won't cover the cost of filling potholes on our roads caused by HDF's large tanker trucks. With the immediate loss of jobs at the Hyatt when the first fly lands on a bride's face getting married at shipwreck beach there will be a substantial loss of revenue to the county in TAT taxes and income taxes. The reality is the State will lose money as the property owners request their taxes be lowered with the home values dropping. It will cost the county and state as employees that have lost their jobs file for unemployment and welfare. Why is this not considered in the DEIS.**

HDF Volume 1 DEIS pg 4-50 (pdf pg 142)

"Once the facility is established and dairy operations have reached the committed herd size, approximately 11 direct and indirect full-time equivalent jobs would be sustained on Kaua'i, including 5 farm jobs and about 6 indirect jobs. An additional 3 indirect jobs would be created on O'ahu. For the contemplated herd size direct and indirect employment will roughly double.

Once fully operational with a herd of 699 mature dairy cows, annual direct-plus-indirect sales are estimated annually at \$8.1 million on Kaua'i, with an additional \$2 million on O'ahu.

When the dairy has matured to full production for the 699-cow dairy, net income to the State is calculated to exceed \$60,000 annually. Net income to the County from HDF is anticipated to generate \$51,000 (PEP, 2016)" HDF Volume 1 DEIS pg 4-50

******* This came as a surprise to the Mayor of Kauai. What had HDF been telling him?**

HDF Volume 1 DEIS pg 4-33 (pdf pg 125)

"The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs. Information received from the community indicates the Māhā'ulepū ahupua'a has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. Gathering of plants and marine resources, and two known State sites are outside the project area: State Site 50-30-10-2250, the agricultural heiau; and State Site 50-30-10- 3094, a carved petroglyph boulder. No significant cultural sites occur within the HDF site. No change to current cultural practices within the Māhā'ulepū ahupua'a will occur from dairy establishment or operations."

HDF Volume 1 DEIS pg 4-34

**** The Moku for Maha'ulepu Ahupua'a has been denied access by HDF and the landowner.**

HDF Volume 1 DEIS pg 4-34 (pdf pg 126)

"A somewhat unusual aspect of the flora is the abundance of a number of weedy herbaceous dicots in the fields. Species, such as false ragweed (Parthenium hysterophorus), kikānia (Xanthium strumarium), little bell (Ipomoea triloba), fuzzy rattlesnake (Crotalaria incana), sensitive plant (Mimosa pudica), and prickly sida (Sida spinosa), are especially abundant covering large areas of relatively recently disturbed pastureland. Guinea grass (Urochloa maxima) and California grass (Urochloa mutica) are dominant in areas where the pasture has not been disturbed recently by tilling or ungulate browsing, and are abundant mixed with the dicot herbs just mentioned." HDF

Volume 1 DEIS pg 4-34

****Why isn't the probability of endangered plants, birds and anthropods thriving if the wetlands that the ditches have destroyed was allowed to comeback. Maha'ulepu valley use to be a swamp per 1897 map see attachment 1. There are two wetlands showing on the US Fisheries and Wildlife's inventory or wetlands. See attachment 11. Also, the Kapunakea Pond was drained. See old map Historic Features of Grove Farm in 1875. See attachment 12.**

HDF Volume 1 DEIS pg 3-14 (pdf pg 66)

"The raised, concrete troughs will be placed on a stable crushed rock base at a height that allows cows to reach over and into the water, but..."

"Much of the existing drainage infrastructure, installed and used for sugarcane irrigation, will be restored where possible and reused or improved."

HDF Volume 1 DEIS pg 3-14

****This is a bold face lie, as they are already there. Just like HDF lied about them not being there in their Storm water application. The farm manager said in deposition that they were already there. There are also have pictures of them from our court ordered site visit. See attachment 13.**

HDF Volume 1 DEIS pg 3-14 (pdf pg 66)

"Siting, design and construction of the ponds will be in compliance with the University of Hawai'i College of Tropical Agriculture and Human Resources (CTAHR) and technical guidance from NRCS. The Livestock Waste Management Guidelines (U.H., 2010) requires storage facilities for animal wastes should provide a minimum buffer of 1,000 feet from public drinking water resources, and 50-feet from surface water resources. At their closest points, the ponds will be sited approximately 125 feet from the nearest drainage ditch, and 3,420 feet from the nearest public drinking water well (Figure 3.3-5)." HDF Volume 1 DEIS pg 3-14

**** The DEIS does not talk about a setback from wells 14. If wells 14 become contaminated, the contamination can affect the public drinking water wells. What about a thousand foot set back from the monitoring wells. One of the monitoring wells is less than 1,000 feet from the public drinking water well. If it gets contaminated it will immediately contaminate well F.**

"Guidelines for Livestock Waste Management " January 19, 2010 A.4

B. Site Guidelines

The following are general guidelines for the site of the animal feeding operation.

1. Animal feeding operations and the collection, transfer, treatment and storage facilities for animal wastes should provide a minimum distance of 1,000 feet from public drinking water resources and 50 feet from surface water resources and/or state waters;
2. Livestock facilities should not be located, if at all possible, over critical water aquifers and sources of drinking water.

HAR, Title 11, DOH, Chapter 54, Water Quality Standards

§11-54-01.1 General policy of water quality anti-degradation.

Waters whose quality are higher than established water quality standards shall not be lowered in quality unless it has been affirmatively demonstrated to the director that the change is justifiable as a result of important economic or social development and will not interfere with or become injurious to any assigned uses made of or presently in, those waters.

HAR, Title 11, DOH, Chapter 55, Water Pollution Control

§11-55-02 General policy of water pollution control.

(a)

It is the public policy of this State:

- (1) To conserve state waters;
- (2) To protect, maintain and improve the quality of state waters:
 - (i) For drinking water supply and food processing;
 - (ii) For the growth, support and propagation of shellfish, fish and other desirable species of marine and aquatic life;
 - (iii) For oceanographic research;
 - (iv) For the conservation of coral reefs and wilderness areas and
 - (v) For domestic, agricultural, industrial and other legitimate uses.
- (3) To provide that no waste be discharged into any state waters without first being given the degree of treatment necessary to protect the legitimate beneficial uses of such waters;
- (4) To provide for the prevention, abatement and control of new and existing water pollution and
- (5) To cooperate with the federal government in carrying out these objectives.

Any industrial, public or private project or development which could constitute a new source of pollution or an increased source of pollution shall in its initial project design and subsequent construction, provide the highest and best degree of waste treatment practicable under existing technology.

Permits issued under this chapter and the related applications, processing, issuance and post-issuance procedures and requirements shall be at least as stringent as those required by 40 CFR §123.25(a).

(b)

(c)

Guidelines for Livestock Waste Management January 19, 2010 E.15

HDF Volume 1 DEIS pg 3-18 (pdf pg 70)

"With the committed herd size, there will be approximately 150 calves on the HDF site at any one time. Approximately 50 calves would be housed within the calf sheds, with approximately 100 calves on pasture, grazing. The actual numbers will depend on the calves' age, size and health status. Once the calves reach approximately 165 pounds or 90 days of age, they will be transferred to an offsite calf raising facility (see Sections 3.7 and 3.8.4, Offsite Herd Management)." HDF Volume 1 DEIS pg 3-18

****699 cows are going to give birth within 15 to 60 days of arrival per testimony of Jim Garmatz under oath in deposition, that is substantially more than the sited approximately 150 calves. It says HDF will keep them until 90 days old. If these 699 cows are taking a plane from the Midwest to Honolulu (about a 7-hour flight) then taking a truck to the port, then being barged across the open ocean, then traveling by truck to the dairy farm, how many will die or miscarry?**

HDF Volume 1 DEIS pg 3-21 (pdf pg 73)

"3.5.1 PADDOCKS, FENCING AND SETBACKS"

"To protect water quality of surface water and downstream areas, paddock fences are set 35 feet back from the top of bank of drainage ways in the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality." HDF Volume 1 DEIS pg 3-21

****Because HDF destroyed the buffer zone during grubbing and grading. See attachment 10.**

HDF Volume 1 DEIS pg 3-21 (pdf pg 73)

"Fencing is essential to containing cows for safety, protecting water quality, and optimizing animal and pasture health, milking output, grazing coverage, and nutrient distribution. A permanent perimeter fence will be constructed using steel t-posts installed every 10 feet, and a wooden post placed every 50 feet. The fence will include 42-inch woven wire topped with a strand of straight wire at 48-inch height, with a strand of barbed wire at ground level to deter feral pigs. Within the perimeter fence, paddock fencing will consist of two or three strands of electric wire mounted on wooden t-posts. Electric fencing is the standard material used for cows and cattle as it is effective and moved with relative ease to re-configure paddocks." HDF Volume 1 DEIS pg 3-21

**** What about the US Fisheries and Wildlife's letter to you stating no barb wire and no electric fences as these will harm our endangered species. See attachment 14.**

HDF Volume 1 DEIS pg 4-36 (pdf pg 128)

"There is no critical habitat for endangered species in the upper Māhā'ulepū Valley. Four species of endangered water birds have been recorded on the site, though the area does not provide critical habitat." HDF Volume 1 DEIS pg 4-36

**** If there wasn't a US Fisheries and Wildlife's employee to monitor then when HDF ripped out over 150 trees per Jim Garmatz testimony in deposition, substantial habitat would have been destroyed. How much habitat was destroyed? What will happen now to these endangered birds that come back to the same spot to nest every year? This is a significant impact on the endangered birds.**

HDF Volume 1 DEIS pg 4-43, 4-105 and 6-21 (pdf pg 135,197 and 273)

"Construction work at the project site will involve activities that may generate an increase in noise levels. Noise related to construction will be a short-term condition, occurring during daylight hours." HDF Volume 1 DEIS pg 4-43, 4-105 and 6-21

HDF Volume 1 DEIS pg 4-38 (pdf pg 130)

"If nighttime construction activity or equipment maintenance is proposed during the construction phases of the dairy farm, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly at the ground

- All outdoor lights installed as part of the project will be shielded to reduce the potential for interactions of nocturnally flying seabirds with external lights and man-made structures (Reed et al., 1985; Telfer et al., 1987)
- ****These two pages contradict one another. Inconsistencies.**

HDF Volume 1 DEIS pg 4-40 (pdf pg 132)

"Bees are an essential part of the agricultural ecosystem. Honey bees (*Apis mellifera*) were observed at the watering trough for the Māhā'ulepū Cattle Co. stock and on the dairy farm overhead pivot irrigation system. It is to be expected that honey bees will visit any water source set up for the dairy herd." HDF Volume 1 DEIS pg 4-40

****Bees often land in ponds and other water features and drown as their wings get wet. How will this be avoided in the effluent ponds? I suggest HDF cover them.**

HDF Volume 1 DEIS pg 4-40 (pdf pg 132)

"Kōloa Lava Tube System. There are no known caves or lava tubes found on or adjacent to the dairy farm property. The known caves in the vicinity are approximately 0.75 mile from the closest point to the dairy farm. Several miles away from the dairy farm property is the Kōloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua'i Cave Wolf Spider and the Kaua'i Cave amphipod. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kōloa area contain these animals. Per the 2006 U.S. Fish and Wildlife Service (USFWS) Draft Recovery Plan for Kaua'i Cave Species, most caves in the Kōloa District do not contain the optimal climatological conditions required by these organisms. Continued development for housing and tourism is described by the USFWS (2006) as potentially leading to the destruction of remaining cave habitats in the area."

HDF Volume 1 DEIS pg 4-40

******* you forgot to mention the Waiopili stream that connects the dairy to the cave. You also forgot the "Reconnaissance Survey of Maha'ulepu". Island of Kauai, that clearly states that the Maha'ulepu Is hydrologically connected. You also forgot that US dept of Interior Fisheries and Wildlife sent you a letter dated Feb 23, 2015 that states the dairy is hydrologically linked to the cave. Why are you talking about a 2006 draft plan when you have a letter directed specifically to Jeff Overton, Group 70 that clearly states you**

Arthropods

The Kauai cave wolf spider and the Kauai cave amphipod are found only on the island of Kauai in the Kōloa area from four to six caves respectively. They occur in small, subterranean spaces, voids, and cracks, requiring a woody debris food source. Cave ecosystems are threatened by contamination from surface sources of toxic chemicals from spills, pesticides, and waste disposal which enter caves via streams and/or ground-water seepage. The proposed HDF site is hydrologically linked to the sensitive cave habitats. We recommend the draft EIS address any project components that have the potential to impact the critical habitat (e.g., wastewater and pasture fertilization practices) and minimize potential disturbance.

will have an impact on the endangered blind cave spiders.

HDF Volume 1 DEIS pg 4-66 (pdf pg 158)

"Surface water is estimated to carry three times more nutrients than groundwater moving through the alluvium on the valley floor (see previous discussion, Groundwater). The groundwater and surface water analysis (Appendix E) estimates two percent of total nitrogen and one percent of phosphorus could potentially pass through the turf and soil. Given the poor permeability of the alluvium, groundwater flow would be modest. However, the groundwater level in the alluvium is approximately 80 feet above mean sea level near the HDF monitoring wells 1 and 2. **The groundwater can rise in wetter periods and intersect the deep drainage ditches.** Episodic, seasonal events will result in a modest amount of discharge from groundwater into the surface channel."

HDF Volume 1 DEIS pg 4-66

******* Ground water in contact with surface water. The entire watershed must be considered per Kauai SWAP report. Please take into consideration in your report the entire watershed.**

HDF Volume 1 DEIS pg 4-66, 4-67 (pdf pg 158-159)

"Using NRCS curve number method to compute runoff for the sites' B and D class soils and irrigated pasture in good condition, it is estimated that actual runoff into drainage ways from HDF pasture will only occur when rainfall exceeds 0.8 inches. Based on the 30-year daily rainfall record for the area, such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually (TNWRE, 2016). Applying the estimates of nutrient pass-through to the HDF operational nutrient mass balance, two percent of nitrogen pass through would total 10,000 pounds per year, and one percent of phosphorus pass through would total 900 pounds per year. Note that nutrient release from the dairy site would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall and storm water events. Per best practices, no effluent application would be conducted during such weather events." HDF Volume 1 DEIS pg 4-66, 4-67

****This contradicts the earlier statement in the DEIS that says these rain events will happen every 7 to 8 days. The assumption here is that all the soils can absorb up to 0.8 inches of rain before the soils start to runoff. This is false the Ksat of the majority of the soils is less than 0.8 inches per the NRCS Soils report for Maha'lepu Valley. This is also assuming that the pastures have not been irrigated recently and that it has not rained for a minimum of 3 days prior so that the soils would be dry. These assumptions make the 10 days annually a miscalculation at the least. The other consideration that must be taken into account is the amount of rainfall that would be coming off the Ha'upu mountain and ridgeline that will at a minimum flood the ditches. There is not enough data included in this DEIS.**

HDF Volume 1 DEIS pg 4-67 (pdf pg 159)

"Section 4.20.1, Interrelationships and Cumulative Environmental Impacts, compares the nutrient input from the adjacent Kōloa- Po'ipū region. Nitrogen additions to the near-term marine environment along the Po'ipū coastline are estimated at 38,510 pounds per year from domestic wastewater and landscape fertilization, equating to 3.5 times greater than the potential contribution from HDF; phosphorus of 1,260 pounds per year is calculated and is 1.4 times greater than the potential contribution from HDF." HDF

Volume 1 DEIS pg 4-67

**** Faulty thinking just because all of Koloa & Poipu adds nitrogen and phosphorus does not mean adding HDF's nutrients on top of what already exists doesn't cause a cumulative affect that creates a significant impact on the environment. This is a serious significant impact. Your figures do not take into account what an ongoing mess the Waiopili already is without any further assistance. HDF should not be located here.**

HDF Volume 1 DEIS pg 4-67 (pdf pg 159)



"NRCS Practice Standards and the U.H. Guidebook have established various setbacks to minimize impacts to waterways. Fences will be erected along 35-foot setbacks to exclude cows from drainage ways. The 35-foot setbacks (totaling 70 feet, as setbacks are on both sides of the drainage ways) will be vegetated to act as filter strips and trap soil particles and organic debris from storm water runoff. Manure particles that do not settle out in to the buffer area could be carried into ditch waters and downstream with storm water flows. During runoff events, ditch waters will also contain substantial organic debris, suspended sediment and nutrients from natural and other man- made sources in the watershed. The relative contribution of manure particles in the storm water flows within agricultural ditches will be a small fraction of the total from the watershed."

HDF Volume 1 DEIS pg 4-67

***** a small fraction" is not a quantitative amount. And thusly not appropriate for a DEIS. Why haven't you calculated into your report the runoff from Ha'upu mountain and the ridge as it circles the farm site.**

****How is it the wheels won't transport manure on them when they cross the pastures and then cross the bridges over the streams? This is an impossible situation and the discharge off the wheels must be calculated and included in the discharge figures. The wheels will be traveling across fields that are riddled with numerous smaller ditches, How will the manure that is dragged into these smaller ditches, that are interconnected with the larger ditches, be handled to stop still additional manure laden runoff? How is it that this huge irrigation pivot can spread evenly everywhere then stop to cross a bridge over a stream without dripping. See attachment 15 Pivot dripping after being shut off.**

HDF Volume 1 DEIS pg 1-8 (pdf pg 26)

"Storage Tanks and Silos. The dairy farm will have milk storage tanks, potable water tanks, gasoline and diesel fuel tanks." HDF Volume 1 DEIS pg 1-8

****What precautions will be taken so as to guarantee that none of the gas or diesel ends up in the soil? In the drainage from the pastures into the ocean?**

HDF Volume 1 DEIS pg 1-9 (pdf pg 27)

"Fencing. A permanent perimeter fence will be constructed steel t-posts installed every 10 feet, and a wooden post placed every 50 feet. The fence will include 42-inch woven

wire topped with a strand of straight wire at 48-inch height, with a strand of barbed wire at ground level to deter feral pigs. Within the perimeter fence, paddock fencing will consist of two or three strands of electric wire mounted on wooden posts."

HDF Volume 1 DEIS pg 1-9

*** The Dept. of Fisheries and Wildlife stated in their letter to HDF that barb wire must not be used because of the endangered species might be harmed by the barbs. Why are you ignoring their directives.

Injury or mortality of adults and juveniles may potentially occur due to entanglement or collision with fencing and/or collision with vehicles on farm roads. Additional details on fencing are necessary to assess potential impacts to Hawaiian waterbirds and Hawaiian geese. Electric fencing (commonly used to control movement of cows in pastures) should not be used for fencing as part of the proposed project. To minimize potential collision with vehicles, the Service recommends you install signage near roadways (e.g., farm workers and visitors) to be wary of birds in the areas.

HDF Volume 1 DEIS 1-10 (pdf pg 28)

"Due to the high moisture and moderate temperatures, the microbial activity in the thatch is very high and the excreted manure and effluent will be largely broken down by microbial activity within 24 hours." HDF Volume 1 DEIS 1-10

***Where is the documentation for this statement. Insufficient data.

HDF Volume 1 DEIS 1-10 (pdf pg 28)

"Irrigation. The total pasture area of the farm is 470 acres. The majority of the pastures will be irrigated with irrigation water and/or diluted effluent through the pivot irrigation systems, with the remainder through gun irrigators." HDF Volume 1 DEIS 1-10

** You cannot use effluent with your gun irrigation as it is too close to our drinking water wells. Or near the monitoring wells or wells 14.

HDF DEIS Volume 2 Technical Appendices pg 56 (pdf pg 176)

"8.3.2 Data Acquisition Through the utilization of on-site grass data gathered by HDF, and the Cornell Net Carbohydrate Protein System (CNCPS) model, an estimate of the grass productivity, farm carrying capacity, milk production and manure excretion has been calculated, respectively." HDF DEIS Volume 2 Technical Appendices pg 56

** So which is it? 4 things are named so what was determined by what. (Respectively) Supreme confabulation.

HDF DEIS Volume 2 Technical Appendices pg 59 (pdf pg 179)

** Why does the chart read more rainfall quantity in the effluent pond in January than March when there is less rainfall? Shouldn't the effluent pond be sized on the total rainfall data which is inaccurately identified at 50" in this DEIS. Data used was prior to 1982 and leaves out 2 hurricanes and the 2006 rain event of 40+ days and nights.

HDF DEIS Volume 2 Technical Appendices pg 61 (pdf pg 181)

"Due to the high moisture and moderate temperatures, the microbial activity in the thatch is very high and the effluent will be largely broken down by microbial activity within 24 hours."

** Where did you get this information? Not enough data. Vague at best.

HDF DEIS Volume 2 Technical Appendices pg 19 (pdf pg 105)

"While the underlying hydrological conditions tend to separate the surface and underlying aquifers..."

HDF DEIS Volume 2 Technical Appendices pg 19

** "tend to"! Tend to, is not quantifiable. Must be quantified. DEIS must be accurate and not vague especially since the Source Water Assessment Program report states the aquifer is 51 square miles and unconfined. This DEIS is inaccurate at best.

HDF DEIS Volume 2 Technical Appendices pg 73 (pdf pg 193)

" Table 23B: Summary Nutrient Mass Balance for up to 2,000 Mature Dairy Cows"

** As this DEIS is taking into consideration both the starting herd size and the anticipated herd size. This table shows that the larger herd will create too much phosphorus by 3,695 lbs per year. So it will constantly be leaching and running off into the ocean.

HDF DEIS Volume 2 Technical Appendices pg 4 (pdf pg 48)

Picture of stream/ditch

**There is disturbed dirt piled up and newly excavated rocks close to the ditch

HDF DEIS Volume 2 Technical Appendices pg 23 (pdf pg 109)

"1) The actual productivity of forage grass, and 2) The number of animals consuming forage and 3) The efficiency in returning manures and effluents to the growing grass. The amounts of rainfall are also important in determining the actual nutrient cycles."

**Manure is a very ineffective way of fertilizing the grass as we both know. The amounts of rainfall not only determine the actual nutrient cycles but also the degree to which the manure runs off to the ocean and impacts the coral reef. Please quantify the amount per day of rain each paddock or soil type can take before it runs off and how many days out of the year in the last 25 years have we had that amount of rain. The rainfall figures this DEIS has sited are from before 1982 which means it does not include two hurricanes and the 40+ day rain event of 2006. The reason behind this would be to deceive the community and agencies into thinking 50" is correct. It is not. Provide accurate up to date information. The rainfall that hits the Ha'upu mountain and its ridges must also be calculated into the equation. It's not just the rainfall from the heavens but also the rainfall that propels it way down the mountainside.



HDF DEIS Volume 2 Technical Appendices pg 26 (pdf pg 112)

"Appendix 1. List of HDF paddocks and their most probable drainage class."

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ATTACHMENT 5

**GROUP 70 INTERNATIONAL RESPONSE LETTER TO EILEEN KECHLOIAN, DATED
JANUARY 3, 2017**

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108

1 Q. Did you take pictures for the geophysicist?
2 A. No, we never did.
3 Q. How did he get information about what you did?
4 A. We just told him, called him the next day and
5 told him what we ran into. But this wasn't for his
6 study.
7 Q. What was it for then?
8 A. Our own information.
9 Q. For what kind of information?
10 A. To determine if there was any stone or what
11 depth the stone was at.
12 Q. Was this the area where you planned to put the
13 lagoon, the effluent lagoon?
14 A. Yes.
15 Q. So was part of the purpose to determine depth
16 to groundwater?
17 A. No, we were looking for stone.
18 Q. Have you determined what the depth to
19 groundwater is in that area?
20 A. Varies from time to time.
21 Q. Right where the keyhole pond is, have you
22 determined the depth to groundwater there?
23 A. Like I said, it varies.
24 Q. From what to what?
25 A. Two or three feet.



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January 3, 2017

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Subject: Hawai'i Dairy Farms Final Environmental Impact Statement (EIS)
Māhā'ulepū, Kōloa District, Kaua'i, Hawai'i
Response to Comment on Draft EIS

Dear Eileen Kechloian:

Thank you for your email received July 25, 2016 regarding the Hawai'i Dairy Farms (HDF) Draft EIS. The following responses are offered to your comments. Our responses to your various topics have been grouped into topic categories for ease of understanding and organization.

HDF will be the first dairy in Hawai'i to employ rotational-grazing, which utilizes manure as a valuable resource. This is a fundamental difference and advantage over conventional feedlot dairy operations, which typically have insufficient land to recycle the nutrients for uptake by forage plants and instead rely on imported feed and large storage lagoons to hold manure. The rotational-grazing method is cost-effective as it reduces the need to import fertilizer and feed, and minimizes potential impacts to the environment by using 100 percent of the manure as nutrients to grow the majority of the forage for the herd. Benefits of pasture grazing include, but are not limited to, improved soil health, and increased animal health and productivity. The dairy will feature modern facilities and practices that will comply with all applicable Federal and State environmental standards.

EIS Preparation

While an agricultural project on agricultural lands implemented and operated with private funds does not require environmental disclosure, HDF responded to community concerns by agreeing to prepare an EIS. The EIS is a disclosure document that analyzes the effects of a proposed project or program on the environment including direct, indirect and cumulative impacts, discusses alternative methods or designs to the proposed action, and formulates minimization and mitigation measures to eliminate, reduce, or rectify adverse impacts of the proposed action. This EIS was prepared in accordance with Hawai'i Administrative Rules Title 11 Chapter 200, implementing Hawai'i Revised Statutes (HRS) Chapter 343.

The Final EIS volumes are available in electronic format for everyone to read on a standard computer screen at the most comfortable view orientation and enlargement. When printed with two pages per sheet this entire document is contained within a total of nine volumes. Larger format single page printing would increase this total to more than 15 volumes, making it extremely unwieldy for agencies and the public, and therefore less accessible. Also, generation of this huge amount of printed material would not be consistent with our common objectives of sustainability. Formatting of the Final EIS page margins and dividers has been improved in Volumes 3 through 9 to aid readability.

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Government Rules and Regulations

The construction and operation HDF will be in compliance with government rules and regulations. Guidance from NRCS has been followed in the management of the farm. Refer to EIS Section 3, Appendices C, D and K, and Volume 5.

Flood Preparation

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in EIS Section 4.6.2.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā'ulepū Valley. The effluent pond capacity has been designed to exceed the regulatory requirement of containing the 25-year, 24-hour rainfall event. Under the committed herd size of 699 mature dairy cows, the ponds could hold an additional 45 percent volume; under the contemplated herd size of up to 2,000 mature dairy cows, the ponds could hold an additional 12 percent volume. An emergency containment berm has also been added to the design, providing additional capacity equivalent to 30 days of effluent for the largest possible herd size.

Upslope Drainage

Drainage and flooding analysis conducted for the dairy project is presented in EIS Sections 4.6 and 4.17, Appendix K and Volume 5. The upslope ditches surrounding the upslope boundary of the dairy farm site were created during the prior agricultural operations. The ditches are effective in diverting surface runoff waters away from the farm, preventing the buildup of upslope runoff waters on the subject farm lands.

Nutrients and Marine Environment

The EIS documents the existing conditions of the nearshore marine environment, including a characterization of the biotic environment where water flows to the ocean through Waiopili Ditch. Comparing the characterization of nutrients and biological constituents from surface water samples to those water samples taken in the nearshore marine area reveal that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is a result of physical mixing of water masses. Water sampling results show that elevated levels of indicator bacteria do not extend beyond the shoreline. See EIS Section 4.17.3 *Nearshore Marine Waters*, and Appendix F.

The assertion that "algae blooms" will occur due to elevated nutrients from stormwater has not borne out in the nearshore marine environment off Waiopili Ditch. Even during the typical low rainfall conditions, there is always a discharge from Waiopili Ditch to the ocean, and water quality sampling has documented that the ditch water is elevated in nutrients. Therefore, it would be expected that algae blooms would be occurring under current conditions, but inspection of the nearshore mixing zone indicates that such blooms are not occurring.

A larger body of scientific literature documents that, contrary to popular belief, reef corals do not necessarily require low nutrient water. In Hawai'i, Atkinson et al. 1994 showed that a multitude of corals from around the Pacific Basin growing at the Waikiki Aquarium in high nutrient marine groundwater have higher linear growth rates than corals in the wild. There is no reason to expect that a short-term exposure

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of a very limited community to elevated nutrients will result in any negative impacts to corals in the mixing zone of Waiopili Ditch and the ocean.

Long-term ocean water quality monitoring has been initiated to provide a baseline for the nearshore ocean waters. Future water quality tests will identify any increase of nutrients and bacteriological constituents to the near-shore marine environment. Data from the nearshore water monitoring program will be made available to DOH CWB, dairy neighbors and the local Kaua'i community, and allow for evaluation of possible contamination sources.

Ditch Setbacks

The drainageways and ditches installed in the late 1800s and early 1900s were developed to bring water to and through the site for sugarcane irrigation. HDF will protect water resources from runoff through both physical setbacks and effluent application limits.

The setbacks from agricultural ditches have been established consistent with Best Management Practices for site earthwork, such as would be required by NPDES. Refer to EIS Section 3, Appendices C, D and K, and Volume 5. HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to minimize impacts to waterways. Physical setbacks will be created with fences installed 35-feet from drainageway (totaling 70-feet in width) to keep cows away from surface waters. Within the 35-foot setback, vegetation will be established to create filter strips to capture particulates during stormwater runoff. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways. See Section 3.5.1, *Paddocks, Fencing and Setbacks* in the EIS.

Waiopili Ditch receives runoff from the larger 2,700-acre Māhā'ulepū Valley sub-watershed, including the lands mauka and makai of the proposed dairy. The dairy site represents roughly 20 percent of the sub-watershed. Soil erosion within the dairy will be reduced by establishment of the thick grass ground cover for pasture and filter strips along drainageways. Over the long-term, the surface water quality in the agricultural ditches and Waiopili Ditch will be improved by active management of the dairy site.

Water Demand

Once fully operational at the committed herd size of up to 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai'i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

Leased Farmland

HDF is the lessee of lands owned by Mahaulepu Farm LLC (formed by Grove Farm). This land has been designated as Important Agricultural Land, which is intended for the production of food crops and support of long-term local food sustainability.

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Public Trust Doctrine

The proposed action is consistent with the public trust doctrine. The Hawai'i Constitution states that all public natural resources, including water resources, are held in trust by the State of Hawai'i for the benefit of the people of Hawai'i and that the State should "conserve and protect" those natural resources but also "promote the development and utilization of these resources." The Hawai'i Supreme Court has held that, as a result, the State has a "dual mandate." That mandate is 1) to conserve and protect the water resources of the State, which include both groundwater and surface water and but also 2) to allow for "maximum beneficial use" of those resources, including for agriculture. The Hawai'i Supreme Court has therefore expressly rejected the concept that "resource protection" is a categorical imperative. It has held that the State should allow "controlled development" that, while giving preference to public use, access and enjoyment, "promote[s] the best economic and social interests of the people of this state."

Based on this dual mandate, the State has developed the State water code, which states that it should be "liberally interpreted to obtain maximum beneficial use of the waters of the State for purposes such as domestic use, aquaculture uses, irrigation and other agricultural uses, power development and commercial and industrial uses" while also adequately providing for the "protection of traditional and customary Hawaiian rights, the protection and procreation of fish and wildlife, the maintenance of proper ecological balance and scenic beauty, and the preservation and enhancement of waters of the State for municipal uses, public recreation, public water supply, agriculture and navigation. Such objectives are declared to be in the public interest."

The public trust doctrine therefore involves a balance--protection and conservation of the public natural resources of the State and a maximum beneficial use of those resources, including for agriculture. Designated of "important agricultural lands", including the HDF site, heightens the public interest in development of agriculture as the Hawai'i State legislature has declared that the people of the State have a "substantial interest in the health and sustainability of agriculture as an industry" and, when so designated, the policy of the State is to promote the long-term viability of agricultural uses on those lands, including by "promot[ing] the maintenance of essential agricultural infrastructure, including the irrigation systems." This serves the "compelling state interest in conserving the State's agricultural land resource base."

The proposed dairy farm will use water from Waita Reservoir for irrigation, which is also the water source for several other farmers and ranchers in the area, including a taro farmer. Non-potable water from Waita Reservoir, which uses water from upland streams, provided irrigation water to the sugar plantation that historically operated in the Māhā'ulepū area, and is used for recreational fishing. The reservoir is located west of the HDF site.

Potable water for the dairy farm will be drawn from deep groundwater wells that were installed by the sugar plantation that formerly operated on the site. The potable water will be used as drinking water for people working on the dairy farm and for the cows. As a result, the proposed action will advance both purposes of the public trust doctrine. The dairy farm will advance the important public interest in protecting and conserving agriculture in the State, including on important agricultural lands, and also further the goal of maximum beneficial use of the surface water and groundwater on those important agricultural lands.

Waipili Ditch

Complaints from the public citing the high levels of enterococcus in Waipili Ditch and concerns about the proposed dairy prompted the Hawai'i State Department of Health (DOH) Clean Water Branch (CWB) to conduct a "Sanitary Survey" of the Māhā'ulepū sub-watershed and the adjacent Waikomo watersheds. DOH

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CWB conducted water sampling within the Waipili Ditch and areas upstream, and initiated a series of investigations into water quality issues. The Sanitary Survey findings resulted in an expression of concern by DOH CWB that the number of injection wells and cesspools in the adjacent Waikomo watershed, which includes Kōloa and Po'ipū, are impacting the waters of the Waipili Ditch.

The geological and hydrological composition of the highly urbanized Po'ipū/Kōloa watershed differs from Māhā'ulepū sub-watershed, resulting in different rates of groundwater movement. Groundwater velocity under the proposed HDF site is on the order of 1.2 feet per day, while the groundwater under the Po'ipū-Kōloa watershed area averages 10 feet per day. The faster movement of groundwater reduces the attenuation period – that is, reduced virulence of bacteria, viruses, and nutrients that occurs with movement through soils.

The Part 1 Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors to the fecal indicator bacteria (FIB) levels in ditches running through Māhā'ulepū Valley. CWB noted that Waipili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. Further testing is needed to more clearly identify whether the source(s) of FIB is human or animals, and DOH CWB has partnered with a University of California laboratory to more definitively determine the source of the fecal contamination in Waipili Ditch. Results will be published as Part 2 of the Waipili Ditch Sanitary Survey. The *Waipili Ditch Sanitary Survey, Kauai Part 1* can be accessed on the DOH Clean Water Branch website under "Library" (<http://health.hawaii.gov/cwb>).

State and County Land Use Policies

The planned improvements and operations at Hawai'i Dairy Farms are compatible with and supportive of State of Hawai'i and County of Kaua'i land use policies, plans and control related to the natural and social environment. The Proposed Project is consistent with and permitted by applicable land use designations and, as discussed in EIS Section 5.0, will contribute a wide range of benefits to further established goals, objectives and policies. In particular, Hawai'i Dairy Farms is consistent with the State and County initiatives for food sustainability and the long-term intended use of Important Agricultural Land (IAL) on Kaua'i. The dairy is also consistent with the provisions of the State of Hawai'i Agricultural Functional Plan, and long-range planning for diversified agricultural use of Māhā'ulepū lands under the County of Kaua'i General Plan and the South Kaua'i Community Development Plan.

The IAL designation process determined that the land meets a number of requirements established in HRS §205-45, including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with 88.5 percent of the area featuring an overall soil agricultural productivity rating of "B" (with "A" representing the class of highest productivity soils and "E" representing the lowest) per the Land Study Bureau of U.H.

Kikuyu Grass

HDF has gathered over 2 years of trial data for Kikuyu grass located at the center of Māhā'ulepū Valley on HDF's leased property. The Kikuyu grass measured consists primarily of Kikuyu with some guinea grass mixed in. Cover crops (diversified forage) were also inserted into the Kikuyu grass during the winter months to provide the additional forage needed when the primarily Kikuyu grass mix may not be as productive. The use of diversified forage is recommended by the National Resource Conservation Service (NRCS) Conservation Practice Standard – Nutrient Management Code 590.

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Forages were cut, analyzed, and measured for production, nutrient content and quality, and nutrient uptake rates, over this 2 year span by HDF's forage expert, Farms n' Forages, a locally-owned business that assists many farmers here in Hawai'i. The forage was tested and analyzed by Cumberland Valley Analytic Services (CVAS) which is certified by the National Forage Testing Association, who performed wet chemistry analysis for Dry Matter (DM), Crude Protein, Soluble Protein, Acid Detergent Fiber (ADF), Neutral Detergent Fiber (NDF), Ash, Calcium (CA), Phosphorus (P), Magnesium (Mg), Potassium (K), Sodium (Na), Iron (Fe), Manganese (Mn), Zinc (Zn), Copper (Cu), and in vitro NDF analysis as a method of assessing the nutritive value of the grass trial samples. The nutrient value of the grasses analyzed was then converted to nutrient uptake rates (in lbs of nitrogen and phosphorus per ton of DM by Atlantic Dairy Consulting, through the use of the Cornell Net Carbohydrate and Protein System (CNCPS) Model, which uses farm-specific inputs on feed and diets to yield both approximate milk production and manure excretion values and quality.

HDF coordinated the collection of grass samples beginning September 2, 2014 and repeated sampling every fourth harvest after an 18-day rest period. The intent was to simulate the harvest of grass by cows grazing a paddock every 18 days. Even with the frequent cutting (every 2.5 weeks), forage yields exceeding 16.3 tons of DM per acre per year (incorrectly noted as 16.4 in the CH2M Hill comments) were realized and measured by Farms n' Forages, even in the winter months (with diversified forage). Nutrient uptake, content, and the chemical composition of the grass samples are based upon this cutting schedule, without over-fertilization based upon HDF's grass & forage expert's recommended fertilizer application rates, or over-irrigation based upon visual observation beyond the agronomic need of the crop.

HDF believes grass yield rate of 16.3 tons of DM per acre per year and the nutrient uptake rates of 64 pounds of nitrogen removed per ton of DM and 11.4 lbs of phosphorus removed per ton of DM, as shown in the Nutrient Balance Analysis of the DEIS, are reasonable and realistic rates based upon the work and analytics performed by Farms n' Forages, CVAS, and Atlantic Dairy Consulting. *Other data from Hawaii also with the highly productive C4 grasses document world class, high levels of productivity are realistic (Valencia-Gica et al. 2012 data from Hawai'i) (Yost).* The yield rates and nutrient uptake/removal rates provided are in accordance with NRCS guidance and provide a realistic projection of the yield production and nutrient uptake for a planned dairy operation. It is consistent with the requirements and processes of the NRCS – Nutrient Management Code 590.

While the yield production and nutrient removal rates shown in the DEIS would not be the exact nutrient uptake numbers based upon the actual operation of the planned dairy, with the commencement of actual animal grazing, manure production, and effluent application, the trials are representative of and realistic for a rotational-grazing, pasture-based dairy operation. The yield production and nutrient uptake rates are based upon appropriate site-specific inputs and certified laboratory testing for yield results and nutrient content and value to the proposed cows used by HDF. Actual grass is being grown on the farm which is fertilized and irrigated, cut, and sampled for actual production and nutrient content and uptake data.

Waste Management Plan

The State of Hawai'i, Department of Health (DOH), Wastewater Branch reviewed HDF's 2014 Waste Management Plan (WMP) for an operation of 699 mature dairy cows, as required by the *Guidelines for Livestock Management* (DOH, 2010). DOH Wastewater Branch completed its review, and HDF obtained building permits for construction of the dairy facility. The WMP is not a component of the EIS, however, all relevant information in the updated WMP was incorporated into the DEIS to ensure consistency and transparency for public review and disclosure.

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Manure Nutrient Source

There are no plans for using manure for the development of compost material or for waste-to-energy purposes. The manure will be utilized as a nutrient source for the pasture grass, as elaborated upon in EIS Chapter 3, Appendix D and Volume 5.

Irrigation System

The EIS Section 3 presents the project description, and EIS Appendix D includes the updated Nutrient Balance Analysis (NBA) which describes more details on the irrigation systems. HDF is following all appropriate USDA – NRCS and DOH standards, practices, and guidelines, which allow for livestock as-excreted manure in addition to land application of manure on agricultural facilities for the use in growing crops. If not for the assumption that over a period of time, manure application is spread relatively evenly over the paddock and not concentrated in one spot, virtually every livestock or ranching operation would have flawed nutrient balance calculations with respect to accounting for nutrients from as-excreted manure.

The original Waste Management Plan called for drip irrigation in the makai areas of the farm, which will now be irrigated using gun irrigation system. The irrigation system consists of pivots which cross portions of the Waipili drainage ditch and another separate agricultural drainage ditch which ultimately discharge to the ocean. The pivot systems are equipped with a drop hose valve that is composed of a composite material, with small sensors that are low maintenance and resistant to salty weather conditions.

Proper operations, maintenance, and repairs of the irrigation system will prevent potential impacts to water quality and prevent direct discharge into the drainage ditches. Stringent preventative maintenance will be in place to make sure all facets of the irrigator operate to the pivot operator's needs. The pivot operator will be responsible to maintain and look after each pivot while in operation. Only one pivot will operate at any given time (though the system is designed and is automated enough such that two pivots may run at the same time), ensuring that the operator is focused and attentive to the one operating pivot.

Acoustics

EIS Section 4.12 discusses noise impacts and mitigation. The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Equipment will typically be used during daylight hours. Dairy operations will comply with applicable noise control ordinances. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Maximum permissible sound levels apply to any point at or beyond the property line, and are not to be exceeded more than 10 percent of the time within any 20 minute period.

Dairy operations will generate noise in keeping with the agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

Animal Cemetery

HDF has adequately planned its cemetery site and has incorporated Best Management Practices to protect water resources surrounding the HDF site. The animal cemetery is specifically located on the north side of the farm, in an area of relatively flat pasture. Site selection criteria for the cemetery paddock included protection from prevailing winds, and distance more than 100 feet away from any drainageway, 200 feet from any natural watercourse, 300 feet from any well, and more than 20 feet from any buildings. Within the cemetery paddock, pits will be sited based on soil suitability and slope. A containment berm will be created around the pit area to prevent both run-off on to, and from, the cemetery site. An area of approximately 5,000 square feet is needed for the animal cemetery at the contemplated herd size of up to 2,000 mature

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dairy cows, which is a fraction of a 3- to 5-acre paddock. Based on preliminary analysis, HDF does not anticipate encountering groundwater in the cemetery paddock area. Pits will be lined as needed in accordance with NRCS Conservation Practice Standard, Animal Mortality Facility Code 316, to protect groundwater quality.

Setbacks

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to minimize impacts to waterways. Physical setbacks will be created with fences installed 35-feet from drainageway (totaling 70-feet in width) to keep cows away from surface waters. Within the 35-foot setback, vegetation will be established to create filter strips to capture particulates during stormwater runoff. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways. See Section 3.5.1, Paddocks, Fencing and Setbacks in the EIS.

Waiopili Ditch receives runoff from the larger 2,700-acre Māhā'ulepū Valley sub-watershed, including the lands mauka and makai of the proposed dairy. The dairy site represents roughly 20 percent of the sub-watershed. Soil erosion within the dairy will be reduced by establishment of the thick grass ground cover for pasture and filter strips along drainageways. Over the long-term, the surface water quality in the agricultural ditches and Waiopili Ditch will be improved by active management of the dairy site.

Animal Cemetery

Additional detail is provided to the previous response to the comment on the animal cemetery.

A containment berm will be created around the pit area to prevent both run-off on to, and from, the cemetery site. Six (6) pits, approximately 20' x 40' overall and 8 to 10' deep, are designed to accommodate carcasses of up to 150 cows and 360 calves or stillborn animals at the contemplated herd size. Individual pits within the area will be a minimum of 2-feet wide with a length appropriate to bury the carcass. Pits will be lined as required in accordance with NRCS Conservation Practice Standard, Animal Mortality Facility Code 316, to protect groundwater quality. Each animal carcass will be dusted on all sides with ground limestone. The bottom of each pit will be also dusted. Pits can be reused every 18 to 24 months, which is the typical time for a carcass to decompose.

Pit bottoms will be level, and carcasses will be placed in a single layer and covered with at least 2 feet of organic material. Multiple layers may be created with subsequent burials, or additional area within the cemetery paddock may be used as needed. Based on preliminary analysis, HDF does not anticipate encountering groundwater in the cemetery paddock area when excavating the pits. The paddock area will not be grazed.

HDF may also consider procuring and installing an incinerator to use for managing mortality on the farm. The incinerator would meet the appropriate guidance from NRCS Conservation Practice Standard – Animal Mortality Code 316 as well as State and EPA emissions regulations, to ensure no adverse air quality impact from the incinerator operations.

Fauna

Per the advisement of the U.S. Fish and Wildlife Service and the State Division of Forestry and Wildlife, HDF will follow best practices and operational procedures to protect any protected animal species. While there are almost no suitable roost trees within the dairy site, HDF will not disturb, remove or trim woody plants greater than 15 feet tall during the Hawaiian hoary bat pupping season. No effect to bats is expected from

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activities and operations of the dairy farm. All outdoor lights installed as part of the project will be shielded to reduce the potential for interactions of nocturnally flying seabirds with external lights and man-made structures. A predator control program will be implemented and maintained to reduce threats to waterbirds or nēnē transiting through or possibly nesting. A Draft Endangered Species Awareness and Protection Plan has been completed in consultation with USFWS and DOFAW prior to dairy construction and operations, to ensure that dairy operations would not result in deleterious impacts to protected wildlife.

HDF shares the concern of herbicide and pesticide impacts on the HDF site and surrounding environment. Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Such control would only be used when needed by those qualified to apply chemicals, and in accordance with authorized procedures and regulatory labeling requirements. Safe application practices for any unavoidable herbicide or pesticide include specifically targeting the problem pest species. Integrated pest management (IPM) will be the preferred means to control pests; this method disrupts the reproduction potential of pests by appropriate means at key points in the life cycle.

There are no known caves or lava tubes found at or adjacent to the dairy farm property. The nearest cave of the Kōloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua'i Cave Wolf Spider and the Kaua'i Cave amphipod, is located 0.75 miles from the dairy farm property. There is no evidence of lava tubes or caves on the property, and no such features have been reported for the area near the HDF site. No cave invertebrate species will be affected by the dairy farm.

Based on hydrological knowledge derived from all drilled wells analyzed by Nance, the downslope movement of ground water from below the pastures toward the habitats of listed arthropods will not reach into the referenced habitats. Recognizing that the food supply of the wholly saprophagous amphipod is organic matter derived from roots and other decaying plant debris, and since nitrogenous and phosphoric nutrients will promote plant growth, their effects, if anything at all, can be expected to expand the food supply in this oligotrophic subterranean ecosystem.

Flies

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest's life cycle. Used in Hawai'i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species. An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which can bury manure in one to three days and thereby incorporate organic matter into the soil. Disrupting and removing the dung interrupts the egg to fly lifecycle, which requires from 7 to 20 days depending on the type of fly. Populations of dung beetles found on Kaua'i and those species already in Māhā'ulepū Valley will expand with the growing manure food source, thus increasing and speeding breakdown of manure while preventing fly larvae from hatching. Fly minimization measures are further described in EIS Section 4.11.

Economics

Results of technical studies and the findings of this EIS show no unmitigated nuisances that could affect property values as a result of dairy construction or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. Odor is a nuisance impact that may reach beyond the dairy boundaries but will be limited to adjacent farm and ranch lands owned by Mahaulepu Farm LLC, lessor of the dairy site, and would occur for limited and infrequent duration. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property

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sales or property values in the area. EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

Comments by Kilpatrick about the adverse economic impacts of the dairy appear to be based on nuisance parameters and footprints of conventional feedlot dairies found on the mainland, not on those of the planned Dairy which will be a modern facility that uses rotational pasture-grazing. Results of technical studies presented in this EIS show no unmitigated nuisances that could affect property values as a result of dairy construction or operations. No noticeable odors, flies, noise, waste or water discharges will negatively impact resort and residential areas. The review of property values adjacent to beef cattle operations in the Kōloa region reveals newer homes with large square footage in a luxury residential community with 2016 assessed values of \$1,297,150 per lot, to \$2,893,100 per lot with a home. The proposed dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

Air Quality/Odor

HDF considered comments provided by Exponent to the odor results for the dairy contained in the Draft EIS: *Air Emissions and Odor Evaluation Technical Report* (Arcadis, May 2016). Exponent prepared its own odor emission report based on two alternate methods:

1. Exponent used different assumptions on the timing of effluent irrigation and slurry application, as well as different sources for odor emission rates, and
2. Odor results were compared against a lower threshold than that used by Arcadis. Exponent argued the threshold “was not considered appropriate for a sensitive population such as hotel guests at a resort area.”

Exponent concurred with the emission methods and results presented by Arcadis that quantify odor from the effluent ponds and the dairy facility buildings. The air emission components of the Arcadis May 2016 report were not commented on by Exponent.

The HDF air quality and odor technical expert, Arcadis, reviewed Exponent’s comments and odor report. To consider the two alternate methods used by Exponent, Arcadis verified operational procedures with HDF: 1) Slurry application will not coincide with effluent application, and 2) slurry will not be applied during days with average wind speeds less than approximately 9 miles per hour (mph) (4 meters per second - m/s) or with winds greater than 20 mpg (8.9 m/s). Additionally, HDF confirmed that the dilution of irrigation water with effluent will change based on field conditions. For these reasons, Arcadis recommended refining the odor model to depict both the “typical” irrigation effluent odor and the “wet condition” irrigation effluent odor. Additionally, Arcadis adapted the data used by Exponent (Jacobson et al., 2001) to account for differences in diet and for the Kikuyu thatch that will receive manure at HDF as opposed to a conventional compacted dirt feedlot which was used by Exponent. The findings of the revised odor technical report are summarized below.

On the second point, Arcadis responded that an evaluation by Mahin (2001) show off-site standard or guidelines in the U.S. to be between 2 and 50 OU/m³ with the majority of values between 5 and 7 OU/m³. Low OU/m³ values are often difficult to observe. For instance, California’s South Coast Air Quality Management District states that at 5 D/T (OU/m³) people become consciously aware of the presence of an odor and that at 5 to 10 D/T odors are strong enough to evoke registered complaints. Given the conservative nature of the air dispersion modeling, a threshold of 6.5 OU/m³ continues to be appropriate.

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For the reasons above, the revised odor report modeled irrigation effluent at two dilutions in no-wind conditions (considered “worst case”), and slurry effluent with wind speeds between 9 and 20 mph, and again used the threshold of the 6.5 OU/m³ annual extent odor level. Modeling was done for both the herd size of 699 mature dairy cows (Section 4.19.2) and for the contemplated herd size of up to 2,000 dairy cows (Section 4.25.2). The colored areas in the figures depict the 99.5th percentile threshold of 6.5 OU/m³. Within the detection area odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year.

Without a dairy in operation, computer-generated modeling was used to determine the potential impact. Results for the committed herd size of 699 mature dairy cows For the typical effluent irrigation conditions show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or just 44 hours per year, within one-quarter of a mile south of the dairy farm boundary. For wet periods, odor could extend approximately 2,151 feet (less than one-half of a mile) beyond the southern boundary. The closest public use areas beyond the odor extent south of HDF are a stable and golf course, both approximately 0.5 miles further south, and the closest residential and resort units are 1.3 miles beyond the possible odor extent (EIS Figure 4.19-1).

HDF has elected to restrict slurry application to periods when wind speeds are between 9 and 20 mph. With application at the most impactful location, paddocks south of the taro farm, the odor from slurry application barely crosses the southern boundary. Due to wind speeds within this range occurring on average 243 days of the year, the 99.5th percentile is reduced to potentially perceiving the odor just 29 hours per year. It should be noted that the parameters used in the odor assessment were intentionally very conservative and the impacts shown depend on an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location; thus, actual offsite odor impacts are likely to be much lower and/or less frequent than displayed. All potential odor would remain on surrounding agricultural lands.

For the potential future contemplated herd size of up to 2,000 mature dairy cows, the nearest recreational area, Po’ipū Bay Golf Course, lies another 0.3 miles beyond the odor extent for the typical effluent application (EIS Figure 4.25-1). During unusually wet periods, odor could extend approximately 4,085 feet (approximately three-quarters of a mile) beyond the southern boundary for the contemplated herd size. With application at the most impactful location – paddocks south of the taro farm – the odor from slurry application could extend approximately 1,580 feet, or less than one-third of a mile. Under either herd size, odors would not reach recreational or residential areas. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

The odor isopleth for the typical irrigation effluent extends beyond the dairy farm boundary approximately 3,070-feet (over one-half mile), which would not reach recreational or residential areas (Figure 4.25-1). As explained in Section 4.19.2, the parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown (Arcadis, 2016).

The full Exponent report *Odor Impact Assessment Hawaii Dairy Farms* (2016) is in the Final EIS, Volume 5, Appendix B. The complete response by Arcadis is contained in the Final EIS Volume 5, Appendix B-B. The revised odor report by Arcadis is also attached to their initial air quality and odor report in the Final EIS Volume 2, Appendix I as Attachment 1.

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Groundwater

Though the confined groundwater tapped by the County wells is hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the nearest County well (Kōloa F) in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section of the EIS. Additionally, the flow of groundwater to the County's Kōloa wells is shown as "pathlines" that identify the direction from which deep volcanic groundwater flows to the well from. The flow is modeled from the west- north-west. HDF is to the east (EIS Figure 4.16-3).

While the shallow groundwater in the alluvium is hydrologically separate from the source of drinking water in the deep volcanics, HDF installed four groundwater monitoring wells to allow monitoring of water quality within the shallow groundwater. Existing water quality was sampled to serve as a baseline for the nutrient and chemical constituents of the shallow groundwater within the alluvium. Future water quality samples can then be compared to the data documenting the baseline, or pre-dairy, conditions. Periodic assessments would identify any change to nutrient content that may indicate seepage of nutrients into this shallow waterbody, which could inform nutrient management of HDF and allow for management changes to minimize nutrients not being effectively utilized by the grass crop. Results from the monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

Dairy Model

HDF has adapted the New Zealand model – pastoral-based rotational grazing dairy – to U.S. standards and best management practices. NRCS provides extensive guidance for agricultural operations to meet stringent standards including those under the Clean Water Act. Nutrient management is a key tenet, and the protection of waterways has been applied to the design of HDF paddocks using fencing to create large setbacks from drainages. Setbacks at HDF are designed 35-feet from each bank – for a total of 70 feet – to exclude cows from waterways. The setbacks are vegetated to create filter strips to effectively trap soil particles and organic debris from entering stormwater runoff. Setbacks and buffers from public drinking water resources are also incorporated into the farm design (EIS Section 3.3.2 *Agricultural Infrastructure* and Appendix D *Nutrient Balance Analysis*).

HDF's Nutrient Balance Analysis is predicated on farm specific inputs and calculated outputs using the Cornell Net Carbohydrate and Protein System (CNCPS) model. While the Standard D384.2 Manure Production and Characteristics (ASABE, 2005) can still be used today to estimate manure production and nutrient excretion, the CNCPS model uses more realistic nutrient inputs. ASABE is a simplified and general standard last updated in 2005. The ASABE calculations were reasonably correct in year 2000 but have not accounted for changes in genetics, management systems, and nutritional advances over the past 16 years. The ASABE equations, unlike the CNCPS system, does not use farm specific animal, environmental, and dietary inputs to determine its manure production and nutrient excretion estimates, and instead uses "book values".

NRCS Conservation Practice Standard Code 590 – Nutrient Management allows for the use of realistic nutrient inputs when planning for nutrient outputs. The manure production and nutrient excretion estimates from the CNCPS model are more accurate and represent farm specific animal inputs, dietary inputs from available grass trials from the HDF site, and incorporate changes in farm management, genetics, and nutritional advances. Therefore the CNCPS model is more accurate than if manure excretion and nutrient output was based upon "book values". Manure production and nutrient excretion estimates from Exponent Table 1 are based upon "book values" of the ASABE Standard, which uses the publication

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Dairy NRC 1988 for diet formulations and input (NRC is the National Research Council that published a handbook, "The Nutrient Requirements of Dairy Cattle"). The 28 year old Dairy NRC 1988 is the predecessor of the most recent NRC publication, last updated in 2001. Because of obsolescence associated with these NRC predictions, the 2015 CNCPS model was used for HDF calculations.

References to the CNCPS model calculations can also be found in peer review scientific literature, namely, in the Journal of Dairy Science 98:6361–6380 The Cornell Net Carbohydrate and Protein System: Updates to the model and evaluation of version 6.5 M. E. Van Amburgh, et. al. and also in the JDS 95 :2004–2014 Development and evaluation of equations in the Cornell Net Carbohydrate and Protein System to predict nitrogen excretion in lactating dairy cows R. J. Higgs, et. al. and JDS 81: 2029 - 2039 Evaluation and Application of the Cornell Net Carbohydrate and Protein System for Dairy Cows Fed Diets Based on Pasture Kolver, E.S. et al.

Dairy Herd Size

The herd size for HDF is consistently represented as the potential maximum number of cows guided by the results of the nutrient analysis which reflects the carrying capacity of the land (EISPN Section 2.3 *Proposed Action*; EIS Section 1.2 *Proposed Project*). The distinction between the herd sizes and permit differences is explained in the EIS Section 2.4 *Planned Dairy Development on Māhā'ulepū Agricultural Lands*. During the public scoping meeting, participants expressed an interest to understand impacts of the committed herd size (up to 699 mature dairy cows). HDF agreed to analyze and present impacts at both the committed and contemplated (up to 2,000 mature dairy cows) herd size. Therefore, the probable impacts of the potential contemplated herd size are also analyzed and clearly identified in the Draft and Final EIS.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land.

With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, regardless if the operation is feedlot or pasture-based, additional regulatory review and permitting by the State Department of Health would be required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to submit an application to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive mature dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

NPDES Permit

HDF met with DOH in March, 2014 to determine construction activities that would require an NPDES permit, and was advised such a permit was needed for only construction of the dairy facilities themselves. DOH confirmed that construction activities for the sole purpose of growing crops do not require an NPDES permit per HAR §11-55, Water Pollution Control, Appendix C. HDF also consulted with the U.S. Army Corps of Engineers (USACE) which confirmed, in a letter dated October 22, 2014, that maintenance of existing drainage ditches on an existing farm at the HDF site are not prohibited by or otherwise subject to regulation under Section 404 in accordance with 33 CFR Part 323.4.

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Cumulative Impacts

Subjects raised in your comments regarding cumulative effects are addressed in EIS Sections 4.20 and 4.26. These sections present summary assessments of the potential cumulative impacts and contextual issues associated with the committed herd size and contemplated herd size.

Alternatives

As a part of the EIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in EIS Section 6. Of all the alternative actions and locations considered, the planned agricultural operations of Hawai'i Dairy Farm is the only approach that achieves project objectives and meets each of the five Evaluation Criteria described in EIS Section 2.3.4.

Alternative dairy locations were carefully evaluated in the EIS, with specific consideration of achieving the project objectives and meeting each of the five Evaluation Criteria. The selected site represents the best option among those considered. The alternative location studied in the EIS is a valid representation of other siting options available. Preliminary site screening found other locational options to have unsuitable or less desirable conditions for the dairy in terms of land control, IAL status, soils, slopes, climate, water access, neighboring uses, access and other factors. To provide a meaningful analysis, the EIS evaluation of other alternatives (no action, agricultural subdivision, conventional feedlot) each included quantitative estimates of potential uses and associated impacts.

We appreciate the information you provide regarding alternative locations for the pasture-based dairy. Final EIS Section 6.5 Alternative Location provides elaboration on the very extensive process undertaken to identify the site.

The Hawai'i Dairy Farms project emerged from a group of partners and affiliates, including Grove Farm, Finistere Ventures, Kamehameha Schools, Maui Land & Pineapple and Ulupono Initiative. The group conducted grass trials statewide to determine the best site for a rotational-grazing pasture based dairy. In addition to the grass trials, HDF coordinated with landowners of agriculturally-zoned lands in the State, as well as the Department of Agriculture, the Agribusiness Development Corporation, and the Trust for Public Land. The broader team identified, toured and evaluated six parcels of sufficient size: two on O'ahu; two on Hawai'i Island; and two on Kaua'i. Kaua'i was found to be the optimal location, as it met all the operational requirements for pasture-based dairy:

- Relatively flat, contiguous acres to move cows with minimal stress,
- Soils suitable to efficiently utilize applied nutrients for growth of forage,
- Adequate water for irrigation and operations,
- Suitable climate conditions for animals and grass growth,
- Agricultural-zoned land available for 20 years or more of sufficient acreage to support an economically viable dairy, preferably IAL, and
- Access to required operational support elements (trucking, pasteurization, work force, etc.).

In response to comments on the Draft EIS, Ulupono Initiative again searched for agriculturally-zoned land with potential long-term availability that may have become available in the past few years. An additional 1,300 acres of Grove Farm property on Kaua'i in the Māhā'ulepū area were recently vacated by Pioneer Seed Company. These fields are closer to resorts and residences, and do not provide further benefit to the project or community than the HDF site evaluated in this EIS. Alexander & Baldwin announced in January

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2016 that Maui lands in sugarcane will be transitioned to diversified agriculture in the future. However, water rights and access for diversified agriculture must be settled through a forthcoming process, and water availability is currently unknown. Thus Ulupono Initiative, which conducted the research, is unaware of any new property meeting the requirements for a pasture-based dairy that has become available since its initial evaluation.

Rainfall Events and Flooding

The period of daily rainfall of the Māhā'ulepū gauge (No. 941.1), located on the farm site, that was used for the DEIS is from January 1, 1984 through December 31, 2013, a period of 10,957 days. The available record is for 10,597 of these days, of which only 360 days is truly missing recorded data. Moreover, statistics of this available record closely match the Online Rainfall Atlas of Hawai'i (2013) by Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.L. Chen, P.S. Chu, J.K. Eischeid, and D.M. Delporte. Based on this, the available rainfall records of Station 941.1 were taken to be a reasonable representation of this site's actual rainfall (Nance). In total, 360 days of truly missing records account for only 3.3% of the total time period.

Additionally, points identified by error codes in the publicly available rainfall data also do not necessarily truly reflect missing data. The Māhā'ulepū gauge does not record data every day and in many instances, records a multi-day precipitation record collecting data over a multiple day period instead. In these instances when a multi-day record is collected, the days over that record are labeled with error codes (-9999). The use of the error code does not actually reflect "missing" data in this scenario. A reasonable and realistic daily rainfall estimate may be determined over that multi-day period (e.g. by averaging or by comparison to other available rain gauge data in the area such as HDF's Ag Hub system). As shown in the following table for the month of September 1992, which the CH2M Hill comments specifically point out as a month with significant "missing" data, there are three (3) sets of multi-day precipitation records (MDPR), as well as eight (8) sets of daily records (PRCP). CH2M Hill has identified 19 days of missing data in this month. In fact, there are no days with actual missing data when taking into the account the MDPR readings. The table below reflects the publicly available data in the format received from the National Oceanic and Atmospheric Administration (NOAA) for the Māhā'ulepū 941.1 rain gauge, with the "Notes" column added for discussion:

DATE	MDPR, (0.1mm)	MDPR, (in)	DAPR	PRCP (0.1 mm)	PRCP (in)	Notes:
19920930	-9999		-9999	0	0	PRCP Recording Taken = 0"
19920929	-9999		-9999	0	0	PRCP Recording Taken = 0"
19920928	5	0.0	6	-9999		MDPR Recording Taken over 6 Days = 0"
19920927	-9999		-9999	-9999		If MDPR = 0", then Daily PRCP = 0"
19920926	-9999		-9999	-9999		If MDPR = 0", then Daily PRCP = 0"
19920925	-9999		-9999	-9999		If MDPR = 0", then Daily PRCP = 0"
19920924	-9999		-9999	-9999		If MDPR = 0", then Daily PRCP = 0"
19920923	-9999		-9999	-9999		If MDPR = 0", then Daily PRCP = 0"
19920922	660	2.6	12	-9999		MDPR Recording Taken over 12 Days = 2.6"
19920921	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"
19920920	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"
19920919	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"
19920918	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"
19920917	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"

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19920916	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"
19920915	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"
19920914	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"
19920913	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"
19920912	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"
19920911	-9999		-9999	-9999		If MDPR = 2.6", then Daily PRCP = +/-0.22"
19920910	-9999		-9999	0	0	PRCP Recording Taken = 0"
19920909	-9999		-9999	0	0	PRCP Recording Taken = 0"
19920908	13	0.1	4	-9999		MDPR Recording Taken over 4 Days = 0.1"
19920907	-9999		-9999	-9999		If MDPR = 0.1", then Daily PRCP = +/-0.03"
19920906	-9999		-9999	-9999		If MDPR = 0.1", then Daily PRCP = +/-0.03"
19920905	-9999		-9999	-9999		If MDPR = 0.1", then Daily PRCP = +/-0.03"
19920904	-9999		-9999	114	0.45	PRCP Recording Taken = 0.45"
19920903	-9999		-9999	229	0.90	PRCP Recording Taken = 0.90"
19920902	-9999		-9999	41	0.16	PRCP Recording Taken = 0.16"
19920901	-9999		-9999	41	0.16	PRCP Recording Taken = 0.16"

As noted in the table, the multi-day precipitation total from September 23 to September 28 shows a MDPR of 0 inches. Total rainfall for each day can be assumed to be 0 inches. From September 5 to September 8, another MDPR was recorded of 0.1 inches, also negligible (if averaged, the daily rainfall would equal 0.03", quite insignificant to any agricultural operation). Even within the twelve (12) day MDPR recording of rainfall from September 11 to September 22, a total of 2.6 inches of rainfall was recorded. While the daily totals are not provided, the data is sufficient to characterize rainfall and for use within HDF's Nutrient Balance Analysis and its irrigation management plan, which is based upon monthly rainfall totals. CH2M Hill's comment that the month of September 1992 contains excessive "missing" data is therefore not supported.

Referring to **Table 4 – NOAA – Average Monthly Precipitation Data**, and **Table 12 – Monthly Irrigation Demand** within the Nutrient Balance Analysis, based on the available historical data, NOAA data from the Māhā'ulepū 941.1 rain gauge shows an average rainfall in the month of September of 2.73 inches. Based upon the September 1992 total rainfall for the month at 2.7 inches from the NOAA Māhā'ulepū 941.1 rain gauge, the month appears consistent compared to the historical average, of which the multi-day precipitation data totals do not have any effect on the irrigation demand analysis, as the total rainfall each month is used in irrigation planning. Daily irrigation planning is simply not effective or realistic for farm management.

The Lihu'e rain gauge, utilized in the CH2M Hill comments, is also not representative of the Māhā'ulepū site. It is located on the windward side of the Hā'u'upu mountain range, some six miles from the project site. The CH2M Hill modeled rainfall used is 70.14 inches per year from the Lihu'e station. The modeled rainfall rate is unrealistically high as compared to the average 44.26 inches per year from the Māhā'ulepū rain gauge 941.1. The Māhā'ulepū gauge, in turn, is located on the project site and provides site specific data. *Statistics of this available record closely match the Online Rainfall Atlas of Hawaii (2013) by Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.L. Chen, P.S. Chu, J.K. Eischeid, and D.M. Delparte. Based on this, the available rainfall records of Station 941.1 were taken to be a reasonable representation of this site's actual rainfall (Nance).*

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Historic Preservation

The State Historic Preservation Division accepted the AIS on December 19, 2016 (Appendix G). SHPD concurs with the significance assessments and mitigation recommendations in the AIS, which identifies the 14 plantation-era sites within the project area as significant only under Criterion d (information potential). The letter states no further work is recommended for these sites (50-30-10-2251 through 2262). Two sites outside the Project Area, an enclosure (Site -2250) and a petroglyph complex (Site -3094), were assessed as significant under Criterion d (information potential) and e (cultural value). The SHPD letter states that the current proposed project will not affect these two sites, and no further mitigation is recommended for the project.

Traditional and historic use of the Māhā'ulepū area includes intensive sugarcane cultivation throughout the entire valley (including the project area), as evidenced by the infrastructure in the valley. Early 20th century maps also document the extent of the fields throughout the Kōloa area, showing the entirety of the current project area consisted of sugarcane lands. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

Historic sites identified by the archaeological consultant within the HDF site are associated with Plantation-era sugarcane cultivation and will not be adversely affected by the proposed project. Two sites identified outside the HDF project boundary are associated with pre-European contact and/or early historic times, and while considered significant under multiple criteria occur, these sites are outside the project area. The dairy will be fully enclosed by perimeter fencing along the boundary of the leased premises. Neither site will be adversely affected by the proposed dairy project.

Based on the AIS and CIA technical reports, no significant cultural resources are located on the HDF property. Access to adjacent properties will continue to be the responsibility of the land owner, Mahaulepu Farm, LLC.

Waiopili Ditch

The EIS in Section 4.17.2 refers to polluted streams that have been tested by the Surfrider Foundation. The Kaa'i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. At the time, CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā'ulepū Surface Water Hydrologic Unit.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and public concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā'ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā'ulepū Valley.

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Antibiotics and Hormones

All vaccines, antibiotics, ionophores and hormone therapy will be prescribed via a veterinarian – client – patient – relationship (VCPR). The Animal Medicinal Drug Use Clarification Act (AMDUCA) provides veterinarians acting within the VCPR to provide options so that cows and calves can receive the medications and hormones they need when they need them. Animal History, disease incidence, disease risk, local prevalence, product cost, Federal Drug Administration (FDA) approval and route of administration will be part of HDF-specific veterinary protocols to ensure best animal welfare with the least amount of pharmaceuticals. All vaccination and treatment protocols will follow FDA and AMDCU guidelines.

Unlike conventional feedlot dairy operations, HDF cows will be on pasture up to 22 hours a day, which enhances overall health of the animals and further reduces risk of illness and the need for antibiotics. There will be no use of sub-therapeutic, preventative, or growth promoting use of antibiotics, ionophores or hormones (such as rBST). Antibiotics will only be used to treat individual animals with life threatening situations and only after prescribed by veterinarians following all guidelines of AMDUCA. Furthermore, HDF will follow the best animal welfare protocols, including vaccination protocols for all age classes further to prevent bacterial infection and to minimize the use of antibiotics on HDF. Antibiotics are costly, lead to wasted milk and mean a cow is unhealthy, which is not beneficial to the animals or operations. HDF will limit the use of antibiotics as much as possible. HDF will follow all regulatory guidelines when handling and discarding milk, urine and manure that may contain trace residue from treated animals. HDF estimates less than 5 percent of the herd may be treated for at most 10 days out of the year.

BMPs to be implemented, including the 35-foot setbacks from drainage ways, will additionally reduce the risk of any waste runoff that may include possible product residues. Further, within the paddocks, populations of microorganisms stimulated by additions of effluent are super-active and very effective in inactivating pharmaceuticals and additives due to the reduced half-life resulting from enhanced immobilization and degradation by the microbiological community.

Agricultural Use Consistent with County and State Plans

The planned improvements and operations at Hawai'i Dairy Farms are compatible with and supportive of State of Hawai'i and County of Kaua'i land use policies, plans and control related to the natural and social environment. The Proposed Project is consistent with and permitted by applicable land use designations and, as discussed in EIS Section 5.0, will contribute a wide range of benefits to further established goals, objectives and policies. In particular, Hawai'i Dairy Farms is consistent with the State and County initiatives for food sustainability and the long-term intended use of Important Agricultural Land on Kaua'i. The dairy is also consistent with the provisions of the State of Hawai'i Agricultural Functional Plan, and long-range planning for diversified agricultural use of Māhā'ulepū lands under the County of Kaua'i General Plan and the South Kaua'i Community Development Plan.

The development and long-term operation of HDF will be in full compliance with its agricultural State Land Use District designation, ALISH classifications, and County zoning. The dairy farm will embody the intent of the IAL designation per the Hawai'i State Constitution, by using these protected lands for the intended purpose of diversified agriculture, food production and agricultural self-sufficiency. HDF's development of a dairy also supports the "secondary intent" for lands in the Agriculture land designation, to provide an opportunity for Kaua'i citizens to reside in an agricultural community.

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Your comment, along with this response, will become part of the public record and will be published in the Final EIS. When published, the Final EIS will be available on the OEQC website which you can access using the following URL, and search "Hawai'i Dairy Farms": <http://tinyurl.com/OEQCKAUAI>.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.



Jeffrey H. Overton, AICP, LEED AP
Principal Planner

ATTACHMENT 6

**CURTIS J. BEDWELL COMMENT LETTER TO THE DEPARTMENT OF HEALTH AND
GROUP 70 INTERNATIONAL, DATED JULY 20, 2016**

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Mr. Overton, I am an MAI designated real estate appraiser, the only MAI actively appraising real estate and living on Kauai. I am also a planner by education with my undergraduate degree in Community and Regional Planning from Iowa State University. Prior to my private practice work on Kauai, I was assessor for Kauai County responsible for the valuation of all hotels, commercial properties, and unique situations on the island. I conduct market, economic, and demographic analysis on various areas on Kauai on a regular basis in my work and I can assure you that I know what an economic impact analysis should look like and the type content that should be presented and analyzed. The DEIS your firm has prepared for the proposed HDF development in the Mahaulepu Valley fails to provide even a college freshman level economic impact analysis of the project area and merely regurgitates demographic data, some history of sugar cane cultivation, and descriptions of the market area... there is no real analysis presented. The appendixes in Volume 2 present much data, but there is no analysis of the data.

Page 4-51 states "Results of technical studies and the findings of the EIS show no unmitigated nuisances that would affect property values as a result of dairy implementation or operations." What are these technical studies the DEIS is referring to and where can they be found? As an experienced, professional real estate analyst and appraiser, I cannot find anything in this DEIS that resembles such a technical study. The DEIS also states, "No noticeable odors, flies, noise, waste or water discharges will reach resort or residential areas"; there is significant data and historical accounts from many areas around the mainland United States that refutes this claim. There are rural, farming communities in areas of the Midwestern states that have imposed ordinances requiring a minimum buffer of 4 miles between projects similar to HDF's proposal and residential areas.

The DEIS has complete disregard for the existing, thriving, economic base in the Poipu area. Appendix J of the DEIS, merely states that the dairy will have no impact on the values of property in the region; but where's the analysis that leads to this preposterous conclusion? How was this conclusion determined? As the only active designated appraiser on Kauai I completely disagree with the notion that there will be no negative and only positive implications to Kauai from the HDF proposal and there is significant evidence to the contrary (see attached 2001 and 2015 Appraisal Journal articles authored by John A. Kirkpatrick, MAI, FRICS, PhD). In all my studies and research, I cannot find one case where an enterprise such as this was introduced into a thriving tourism economy; this is because it is an obvious incompatible neighboring use. However, there are dozens upon dozens of cases that prove, without question, that this type of animal production enterprise being located within a few miles of existing residential neighborhoods has significant, measurable negative impacts to property values. This is a fact that is completely disregarded and ignored in the document prepared by your firm.

Respectfully,

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ADDENDA

2015 HOTEL/LODGING SALES			
	Census Tracts	Hotel/Lodging Sales	Hotel/Lodging Sales (%)
Princeville	150070401.03	\$189,507,000	27.8%
	150070401.04	\$617,000	0.1%
	150070402.04	\$926,000	0.1%
Kapaa	150070402.05	\$76,317,000	11.2%
Waipouli	150070403.00	\$40,954,000	6.0%
Wailua	150070404.00	\$46,745,000	6.9%
Lihue/Kalapaki	150070405.00	\$104,550,000	15.3%
Koloa/Poipu	150070406.03	\$213,106,000	31.3%
	150070406.04	\$1,235,000	0.2%
	150070407.00	\$1,699,000	0.2%
	150070408.00	\$2,392,000	0.4%
	150070409.00	\$3,573,000	0.5%
	150079400.00	\$308,000	0.0%
		\$681,929,000	

ASSESSMENT AND TAX TOTALS BY TAX CLASS: TAX MAPS 2-6, 2-8, AND 2-9					
	2015 ASSESSMENT	% of Study Area	2015 TAXES	% of Study Area	# Parcels
Tax Class 1: Residential	\$791,418,800	23.2%	\$5,601,054	20.7%	1,208
Tax Class 2: Vacation Rental	\$1,080,517,200	31.7%	\$9,548,862	35.3%	1,463
Tax Class 3: Commercial	\$136,142,000	4.0%	\$1,024,554	3.8%	94
Tax Class 4: Industrial	\$136,142,000	4.0%	\$1,024,554	3.8%	94
Tax Class 5: Agricultural	\$79,954,600	2.3%	\$500,658	1.9%	114
Tax Class 6: Conservation	\$2,120,100	0.1%	\$13,954	0.1%	5
Tax Class 7: Hotel & Resort	\$775,742,700	22.7%	\$8,415,349	31.1%	845
Tax Class 8: Homestead	\$407,824,800	12.0%	\$933,482	3.4%	630
Tax Class 9: Residential Investor	\$159,953,100	4.7%	\$1,053,509	3.9%	45
Tax Class 10: Commercialized Home Use	\$98,535,500	2.9%	\$386,918	1.4%	124
TOTAL	\$3,668,350,800	17.7%	\$28,502,896	24.1%	4,622
County Total	\$20,716,848,800		\$118,273,260		33,597

Source: HIS - 2015 Assessment Data (Date of Value 10-1-2014)

Concentrated Animal Feeding Operations and Proximate Property Values *by John A. Kilpatrick*

Concentrated animal feeding operations (CAFOs) are often called “feed-lots.” They may include facilities where animals are raised or where animals are brought for slaughter. The common denominator is a large, perpetual inventory and density of animals.¹

Currently, the USDA and the EPA estimate that livestock in the United States produces 130 times the amount of manure produced by the entire human population of this country. Spills from CAFOs have killed fish in several states; phosphorus in land and water has been correlated with livestock density; and manure has caused eutrophication and degradation of U.S. waterways.²

The trend toward CAFOs has been rapid and pronounced in the U.S., but federal and state laws generally are considered to have some gaps. In addition to water quality issues resulting from manure and waste run-off, these facilities attract flies and other insects and pests that parasitize the insects.³

Professor John Ikerd, an agricultural economist with the University of Missouri at Columbia, sums up the problems quite succinctly in a recent working paper when he says, “Piling up too much ‘stuff’ in one place causes problems.” Writing specifically about swine CAFOs, he goes on to comment, “If you spread out the hogs and let hog manure lay where it falls in a pasture, it doesn’t bother anyone very much. But if you start collecting it, flushing it, spreading and spraying it around—all normal practices in confinement hog operations—it becomes air pollution.”⁴

Because of the noxious and obvious problems associated with CAFOs, many states have enacted severe restrictions on permits. For example, in 1997 the

abstract

Property located near a concentrated animal feeding operation (CAFO) will be negatively impacted by this externality. The degree of impairment depends on proximity and property type and use. Properties with higher unimpaired values are probably impacted more than otherwise lower-valued properties.

1. Numerous documents were reviewed to develop this section, see subsequent footnotes for details. Much of the nomenclature comes from Drew L. Kershen, JD, and Chuck Barlow, JD, “Concentrated Animal Feeding Operations and Water, Air, Land, and Welfare.” A report of the American Bar Association Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations, (September 23, 1999).
2. Stephen Jann, “Recent Developments in Water Pollution Control Strategies and Regulations.” Presented at the American Bar Association Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations, Minneapolis, MN, (May 12, 1999).
3. Smith-Comeskey Ground Water Sciences, “Concentrated Animal Feeding Operations – Resources for Environmental Responsibility.” Working paper (April 1, 2000). See <<http://www.groundwatersystems.com/agwaste.html>> for more details.
4. John Ikerd, “Social, Economic, and Cultural Impacts of Large-Scale, Confinement Animal Feeding Operations.” Working paper, University of Missouri (March 2, 2001).

legislature of typically livestock-friendly Oklahoma mandated setbacks and other pollution controls, and in 1998 that legislature enacted a moratorium on new livestock permits.⁵ Kansas is another typically agriculture-friendly state that recently has enacted a moratorium on CAFOs, and it is considering legislation to end CAFOs.⁶ In 1998, the North Carolina legislature, faced with unregulated establishment of CAFOs, enacted House Bill 1480, which mandated the registration of growers for integrators, extended a moratorium, and mandated substantial elimination of both atmospheric emission of ammonia and odor beyond the boundary of existing CAFOs.⁷ Minnesota enacted similar odor control legislation in 1997 and established both a complaint control protocol and an enforcement response protocol specific to CAFOs.⁸

CAFOs and the Value of Nearby Real Estate

A CAFO impacts the value of proximate properties to the extent that the CAFO is viewed, in the market, as a negative externality.⁹ As an externality, it is typically not considered to be economically “curable” under generally accepted appraisal theory and practice.^{10–12} Some of this loss in value may be attributable to stigma, when there are unknowns and risks associated with ownership of the property.

Impairment and Value—An Overview

From an economic perspective, the rights enjoyed by a fee-simple owner fall into three categories:

1. Right of use and enjoyment
2. Right of exclusion
3. Right of transfer¹³

It is important to note that in the U.S. property itself is not “owned,” but rather the rights of the property are owned.¹⁴ The ability to delineate these rights, and the ability of owners to transfer some or all of these rights voluntarily is a necessary condition for property valuation.

Use and Enjoyment

The first of these rights, that of use and enjoyment, is generally interpreted to mean that the owner may determine how property will be used, or if it is to be used at all. The right of use traditionally is limited in western culture by both public restrictions (e.g., eminent domain, police power) and private restrictions (e.g., liens, mortgages). Private restrictions are generally voluntary, and property owners willingly submit to the disutility of such restrictions in trade for some other economic benefit. For example, a property owner will issue a mortgage to a lender in trade for leverage in the purchase. Also, a homeowner will purchase in a subdivision with covenants and restrictions in trade for the assurance of uniform property use within the neighborhood. It is noteworthy that the voluntary acceptance of private restrictions is always in trade for some economic compensation. For example, a property owner may grant a scenic easement, which restricts the use and enjoyment of his or her property, but will expect to be compensated for that easement.

An impairment often places a restriction on the right of use without some economic compensation. This is illustrated in potential restrictions that may be placed on the use of real estate due to a physical impairment and can thus limit the property to something less than its highest and best use. For example, odor or flies from a nearby CAFO will restrict the use and enjoyment of impaired property without compensation.

Right of Exclusion

The right of exclusion—often called the right of exclusive use or right of exclusive enjoyment—provides that those who have no claim on property should not gain economic benefit from enjoyment of the property. In other words, the right of use is exclusive to the property owner, and any violation of the right of exclusive use typically carries either payment of compensation to the rightful owner or assessment of a penalty. For example, if “A” trespasses on land owned by “B,” then “A” will be guilty of a crime and a possible criminal penalty may be in order, as well as civil damages. Physical impairment, such as the odor or flies, in effect is a trespass on property rights and violates the right of exclusion.

Society places a high value on the right of exclusion, for justifiable reasons. Exclusion provides that both the current benefits of ownership as well as future benefits accrue only to the rightful owner, and his/her successors and assigns. In the absence of exclusion, the right of use is under constant threat of nullification without just compensation. In an economy without the right of exclusion, property owners would adopt short-term strategies for use, rather than long-term strategies. In an economic sense, this would lead to widespread inefficiency in the allocation of resources. Hence, the right of exclusion carries with it a significant societal good,¹⁵ and thus a significant, societally recognized value.¹⁶

Right of Transfer

Finally, the right of transfer provides the owner with the ability to swap one resource for another. An impairment restricts the right of transfer, and may destroy the right of transfer altogether.

Effects of Negative Externalities on Property Values

Real estate economics and appraisal practice uniformly recognize that many externalities such as contamination may have a negative impact on property values. For example, appraisers are required by the Uniform Standards of Professional Appraisal Practice (USPAP)

“Real estate economics and appraisal practice uniformly recognize that many externalities such as contamination may have a negative impact on property values.”

to consider the impacts of such contamination in the value estimation process.¹⁷

Fitchen¹⁸ was one of the first to look at the value of the rights of a property owner in the face of impairment—in that case, a toxic chemical pollution. As an anthropologist and a professor of anthropology, she looks principally at residential values and considers not only the real aspects of “violation of the home” by contamination (e.g., carcinogenic effects of polluting chemicals) but also the symbolic interference of what she calls “...a threat to the assumptions people have about themselves and the way life is supposed to be.”¹⁹ She notes, “Toxic contamination also attacks the valued institution of homeownership, violating many of the rights that are assumed to flow from the ownership of one home, including the assumed right to control entry to it....Chemical contamination may affect homeowners more seriously than renters, not only in terms of potential financial loss, but also in terms of devaluation of the achieved status of homeowners.”

Edelstein also deals with this “home” theme, and calls impairment to or near a residence an “...inversion of home...” when “...the previous locus of family security and identity becomes instead a place of danger and defilement.”²⁰ He builds on previous works, such as Perin²¹ and Altman and Chermers,²² that show the very special place the home has in American society, culture, and economics. Perin states, “Not being a nation of shopkeepers, America

5. Michelle Stephens, “NGO and Grassroots Perspectives and Action,” Presented at the American Bar Association Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations, Minneapolis, MN, (May 12, 1999).

6. Roger Myers, “Graves May Lift Licensing Ban on Large-Scale Hog Farming,” *The Topeka Kansas Journal* (24, 1998).

7. Michael C. Williams, “CAFO Odor Control Options,” Working paper, North Carolina State University, presented at the American Bar Association Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations (September 23, 1999).

8. Michael Sullivan, “Minnesota’s Program Regarding Hydrogen Sulfide Emissions from CAFOs,” Working paper, Minnesota Pollution Control Agency, presented at the American Bar Association Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations (September 23, 1999).

9. For a thorough discussion in this context, see Appraisal Institute, *The Appraisal of Real Estate*, 11th Ed. (Chicago: Appraisal Institute, 1996): 46–48, 336–337, 398.

10. *Ibid.*, 336–337.

11. For a discussion of the incurability of external obsolescence, see Hal Smith and John Corgel, *Real Estate Perspectives*, 2nd Ed. (Boston: Irwin, 1992): 524.

12. Under some circumstances, such as a class-action suit, the externality may be curable. However, when considering one impacted parcel alone, the externality probably is not economically curable.

13. While owners’ rights are delineated in many texts, this specific characterization is derived from Austin J. Jaffee and Demetrios Louzotis Jr., “Property Rights and Economic Efficiency,” *Journal of Real Estate Literature* (4, 1996): 137–162.

14. Armen A. Alchian and Harold Demsetz, “The Property Rights Paradigm,” *Journal of Economic History* (53, March 1973): 16–27. See also, Harold Demsetz, “Toward a Theory of Property Rights,” *American Economic Review* (57, 1967): 347–373.

15. See for example, Frank Snare, “The Concept of Property,” *American Philosophical Quarterly* (9, April 1992).

16. George Stigler, “Law or Economics?” *Journal of Law and Economics* (35, October 1992): 455–469.

17. This is specifically covered under USPAP Rule 1-2(e). This is one of the rules from which departure specifically is not permitted. For a thorough discussion of the appraiser’s responsibility see also, J.D. Eaton, *Real Estate Valuation in Litigation* (Chicago: Appraisal Institute, 1995): 128–129, 149–54, 235–37.

18. Janet M. Fitchen, “When Toxic Chemicals Pollute Residential Environments: The Cultural Meanings of Home and Homeownership,” *Human Organization* (48, Winter 1989): 313–324.

19. *Ibid.*, 320.

20. Michael R. Edelstein, “Toxic Exposure and the Inversion of the Home,” *Journal of Architecture Planning and Research* (3, 1986): 237–251.

21. Constance Perin, *Everything in its Place: Social Order and Land Use in America* (Princeton, NJ: Princeton University Press, 1977).

22. I. Altman and M. Chermers, *Culture and Environment* (Monterey, CA: Brooks/Cole Publishing, 1980).

is one of homeowners, busily investing in plant maintenance and expansion with both money and time, keeping the product attractive for both use and sale."²³

Edelstein specifically stresses the investment diminution aspect of the inversion of home principle. In citing case studies of experiences following neighborhood-wide impairment in the Legler section of Jackson Township in southern New Jersey, he shows that residents could not separate the psychological pride in home ownership from the question of economic value. Surveys of the population found uniformity of opinion that property values had diminished as a result of the problem. While previous studies had focused on the diminution of value from existing homes, Edelstein was one of the first to focus on the opportunity costs stemming from the inability to move. In short, homeowners were stuck holding unsellable homes with stagnant prices, while homes in other neighborhoods were soaring in value. Thus, the owners were harmed not only by the diminution of value in the existing residences, but by the opportunity costs inherent in lost gains from alternative home investments.

Value Loss: Stigma Issues

Edelstein refers, in a general sense, to the issue of stigma as a mechanism for manifestation of value diminution in residential property. Stigma is an increasingly common term in appraisal and real estate economics literature, and refers to a very specific quantitative mechanism by which value is impacted by proximate contamination or negative externalities.

The earliest references to stigma as a quantitative concept in real estate economics appear to be in the writings of Patchin²⁴ and Mundy.²⁵ The latter study differentiated between the cost to cure and the cost of stigma. The former is an out-of-pocket

expense born either by the property owner or some other responsible party, while the latter manifests in property value diminution even in the absence of a cost to cure. For example, a property that is completely cured may continue to suffer a diminution in value, and hence damages, because of stigma.

Kilpatrick outlines the quantitative model by which the value of income producing property is reduced by the effects of stigma manifested via increases in market driven capitalization rates.²⁶ He outlines four components of income producing property value impacts: net operating income, actual cost-to-cure, ongoing increases in maintenance, and stigma. In his model, the stigma losses actually overwhelm the other three factors as a component of value diminution. He concludes that under many circumstances the stigma impacts are actually the greater portion of value losses to property owners.

Other Proximate Contamination Issues

The issue of value loss for proximate contamination or other impacts has been considered in a number of studies, and includes how the citing of an externality, such as a CAFO, can impact nearby values. Some of the earliest researchers, such as Blomquist, looked at the impact of locating a power generating plant,²⁷ while Guntermann showed that landfills have a negative impact on the value of surrounding industrial property, and that this value loss has a spatial component.²⁸ Kinnard and Geckler had similar findings for nuclear facilities,²⁹ as did Kinnard³⁰ and Kiel³¹ for hazardous waste sites.

In a similar vein, Colwell analyzes the property value diminution associated with proximity to power lines,³² and Kirshner and Moore show that water quality can impact nearby residential property values.³³ Simons's study of pipeline ruptures shows that diminution in value occurs on properties up to two miles from the site of a petroleum spill.³⁴

Case Studies

The following cases illustrate the effects of CAFOs and the impact of CAFOs on property value.

Minnesota Case Study³⁵

A homeowner in Minnesota lives about two miles from one swine CAFO and about three-quarters of a mile from a second CAFO. When these CAFOs were first opened in the early 1990s, she was initially a supporter. However, she and her family immediately began suffering illnesses, which they attributed to the proximate CAFOs. She contacted the Minnesota poison control center and for the first time learned about the dangers of hydrogen sulfide emissions. She kept track of her illnesses and weather conditions (e.g., wind and direction) and concluded that her illnesses were caused by the emissions from the CAFOs. Testing was warranted, and on at least one occasion the reading was above 1,000 ppb hydrogen sulfide, well above danger levels.

North Carolina Study³⁶

Palmquist, et. al, were the first to quantitatively determine that the distance from a residence to a CAFO has an impact on residential values. However, their study looked only at residences already near CAFOs and measured the impacts of additional CAFO capacity (either new CAFOs or additional livestock at existing CAFOs) located at 0.5-, 1.0-, and 2.0-mile distances from the residence. Nonetheless, they established a methodological model for spatial impacts of CAFOs.

University of Minnesota Study³⁷

In 1996, the Minnesota Department of Agriculture commissioned a study by researchers at the University of Minnesota on the topic of value diminution resulting from proximate CAFOs. In addition to substantial secondary research in the area, the study authors also conducted primary research into value impacts in that state. Specifically, they conducted a hedonic price analysis on 292 rural residences that were sold during 1993–1994 in two Minnesota

counties. They found a statistically significant pricing impact related both to the existence of a CAFO as well as the distance from the CAFO. In other words, not only does a CAFO have a significant impact on property value, but the nearer the CAFO, the greater the impact. The researchers also found that CAFOs tend to be located near older or lower valued homes. Hence, the pricing impacts in a simple empirical study may be muted by other negative impacts to value, and high-valued residences may be impacted to a greater degree by CAFOs than would be suggested by their findings.

University of Missouri Study³⁸

Following the methodology of the Minnesota study, researchers at the University of Missouri were able to quantify both the average value impact of a CAFO and the impact by distance. An average vacant parcel within 3 miles of a CAFO experienced a value loss of about 6.6%. However, if that parcel was located within one-tenth of a mile from the CAFO (the minimum unit of measure in the study) and had a residence on it, then the loss in value was estimated at about 88.3%.

Pasco, Washington Case Study³⁹

A 309-acre family farm that had been operated for many years produced alfalfa, asparagus, corn, apples, peaches, nectarines, cherries, melons, and a range of garden produce. A CAFO was adjacent to the residence (about ¼ mile away), and consequently the farm product was impacted by dust, flies, fly fecal matter, and odor. The farm was appraised for litigation purposes and a value diminution of over 50% was determined, using traditional farm appraisal methods. The CAFO settled the lawsuit by purchasing the plaintiff's farm and relocating the residents to a nearby farm that was not impacted by the CAFO externalities.

Michigan Horse Farm Case Study⁴⁰

A horse-breeding operation (owner-occupied farm) is located approximately 1,000 feet from a recently

23. Perin, 120.

24. Peter Patchin, "Contaminated Properties-Stigma Revisited," *The Appraisal Journal* (April, 1991): 162–172.

25. William Mundy, "Stigma and Values," *The Appraisal Journal* (January, 1992): 7–13.

26. John Kilpatrick, "Appraisal of Contaminated Property," *Career News* (University of South Carolina, Darla Moore School of Business, August 1998).

27. Glenn Blomquist, "The Effect of Electric Utility Power Plant Location on Area Property Values," *Land Economics* (50:1, 1974): 97–100.

28. Karl Guntermann, "Sanitary Landfills, Stigma and Industrial Land Values," *Journal of Real Estate Research* (10:5, 1995): 531–542.

29. William Kinnard and Mary Beth Geckler, "The Effects on Residential Real Estate from Proximity to Properties Contaminated with Radioactive Materials," *Real Estate Issues* (Fall/Winter, 1995): 25–36.

30. William Kinnard, "Analyzing the Stigma Effect of Proximity to a Hazardous Waste Site," *Environmental Watch* (December, 1989): 4–7.

31. Katherine Kiel, "Measuring the Impact of the Discovery and Cleaning of Identified Hazardous Waste Sites on House Values," *Land Economics* (71:4, 1995) 428–435.

32. Peter Colwell, "Power Lines and Value," *Journal of Real Estate Research* (5:1, 1990): 117–127.

33. D. Kirshner and Deborah Moore, "The Effect of San Francisco Bay Water Quality on Adjacent Property Values," *Journal of Environmental Management* (27, 1989): 263–274.

34. Robert A. Simons, "The Effect of Pipeline Ruptures on Noncontaminated Residential Easement-Holding Property in Fairfax County," *The Appraisal Journal* (July, 1999): 255–263.

35. Presentation at the American Bar Association Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations (September 23, 1999). Results of the study not independently validated by the author.

36. R. Palmquist, F. Roka, and T. Vukina, "Hog Operations, Environmental Impacts, and Residential Property Values," *Land Economics* (73:1, 1997): 114–124. Results of the study not independently validated by the author.

37. Steven J. Taff, Douglas Tiffany, and Sanford Weisberg, "Measured Effects of Feedlots on Residential Property Values in Minnesota: A Report to the Legislature," University of Minnesota Staff Paper Series (July, 1996). Results of the study not independently validated by the author.

38. Mubarek Hamed, Thomas Johnson, and Kathleen Miller, "The Impacts of Animal Feeding Operations on Rural Land Values," University of Missouri-Columbia Community Policy Analysis Center Report R-99-02 (May, 1999). Results of the study not independently validated by the author.

39. Mundy Associates, LLC files. Details of case confirmed by property owners.

40. Mundy Associates, LLC files. Details of the case confirmed by property owner and attorneys for both sides.

constructed large scale, pork processing facility. The use and enjoyment of the home has been diminished by airborne externalities, and the ability to use the site as a farm may be compromised as a result of flies carrying animal blood and feces that contain antibiotics and other nuisances. In 2000, the property owner appealed for a property tax reassessment representing a devaluation of over 50% from fair market value, and the county attorney concurred with that appeal.

Michigan Residence Case Study⁴¹

A family purchased a "fixer upper" residence in rural Vicksburg, Michigan in 1995. In 1997, a large-scale pork processing facility was located about 700 feet from the home. The reduction in air quality was so severe as to force the residents to abandon their home and move elsewhere. To date, they have not been able to sell the home. The owner of the processing facility offered to compensate them for 60% of the fair market value of the home (i.e., a 60% diminution in value). As of this writing, litigation is pending.

Summary and Conclusions

The above suggests that the establishment of a CAFO may result in value diminution to other nearby properties. The amount of the value loss is typically an inverse function of distance (closer properties diminish more), a function of property type (newer, nicer residences lose more), and a function of property use (farm will lose value due to diminished productivity and comparative marketability to other farm lands). While the appraisal profession has only begun to quantify the loss attributable to CAFOs, it is clear from the above case studies that diminished marketability, loss of use and enjoyment, and loss of exclusivity can result in a diminishment

ranging from 50% to nearly 90% of otherwise unimpaired value.

When appraising a property located proximate to a CAFO, the appraiser needs to consider seven specific issues, each of which will have an impact on the value conclusions:

1. Type of subject property,
2. Distance to the CAFO,
3. Physical manifestations (e.g., air quality, insects),
4. Engineering/scientific testing performed (e.g., air quality),
5. Impacts on property use (e.g., habitability, rental income or vacancy),
6. Marketability evidence (e.g., time on market of comparable properties), and
7. Impact on highest and best use.

While there is little disagreement that a CAFO has an impact on surrounding property values, the degree of impact is clearly a function of the interplay of these factors.

John A. Kilpatrick is a partner and senior analyst with Mundy Associates, LLC, an economic, market, and valuation firm specializing in complex real estate matters headquartered in Seattle, Washington. Kilpatrick is the author of four books and numerous articles on real estate matters, and is a frequent speaker on real estate economics and valuation. He did his graduate work in Real Estate Finance at the University of South Carolina.
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Table | Summary of CAFO Impacts

Case Study	Value Loss	Remarks
Minnesota	N/A	Significant diminution in air quality
North Carolina	N/A	Established distance component to value
University of Minnesota	N/A	CAFO sited near older, less-expensive homes
University of Missouri	Residential 3 miles: 6.6% Residential 0.1 mile: 83% Family farm adjacent: 50%	Quantified average value impact by distance Impact included flies and loss of farm income
Washington		
Michigan farm	Farm adjacent: 50%	Impact included loss of use as a farm
Michigan residence	Residence adjacent: 60–100%	Residence abandoned, could not be sold

41. Mundy Associates, LLC files. Details of the case confirmed by property owner and neighbors.

Animal Operations and Residential Property Values

by John A. Kilpatrick, PhD, MAI

Animal operations (AOs) may be broadly defined as facilities in which animals are raised or brought for slaughter. The common denominator is a large perpetual inventory and density of animals.¹

Although livestock and poultry production has more than doubled in the United States since the 1950s, the number of animal operations has decreased by 80%.² Food animal production in the United States has shifted to concentrated facilities where animals usually are raised in confinement. This concentration of animals brings environmental concerns related to air and water quality as well as animal and human health. As a result, animal operations are subject to regulation by the US Environmental Protection Agency (EPA), the US Department of Agriculture (USDA), and a variety of state entities. Laws and government regulations related to animal operations include specific definitions based on the function and size of the operations. For example, the EPA defines *animal feeding operations* (AFOs) as

agricultural enterprises where animals are kept and raised in confined situations. AFOs congregate animals, feed, manure and urine, dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures, fields, or on rangeland.³

To qualify as an AFO, an animal operation must confine animals for at least 45 days in a twelve-month period.⁴ According to the EPA, there are approximately 450,000 AFOs in the United States.⁵ The EPA also designates certain AFOs as *concentrated animal feeding operations* (CAFOs) based on the confinement of large numbers of animals and the pollutant discharge. At CAFOs, there is a higher concentration of waste that increases the potential impact on air, water, and land quality.⁶ CAFOs are regulated by the EPA under the Clean Water Act,

1. Quite a few documents were reviewed to develop this discussion; see subsequent footnotes and Drew L. Kershen and Chuck Barlow, "Concentrated Animal Feeding Operations and Water, Air, Land, and Welfare," report on the American Bar Association (ABA) Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations (September 23, 1999).
2. EPA, *Literature Review of Contaminants in Livestock and Poultry Manure and Implications for Water Quality* (EPA 820-R-13-002, July 2013), 3; <http://water.epa.gov/scitech/cec/upload/Literature-Review-of-Contaminants-in-Livestock-and-Poultry-Manure-and-Implications-for-Water-Quality.pdf>.
3. EPA, "What is a CAFO?," <http://www.epa.gov/region07/water/cafo/>.
4. Ibid.
5. EPA, "Animal Operations," <http://www.epa.gov/agriculture/anafoix.html>.
6. http://www.epa.gov/region07/water/cafo/cafo_impact_environment.html.

FEATURES

ABSTRACT

Animal feeding and processing operations have grown more concentrated, with each facility handling much larger numbers of animals than traditional farms. The larger concentration of animals impacts the quality of surrounding air and water. In addition, the facilities impact the economic conditions of the communities where they are located. All of these factors can potentially affect the value of nearby houses. This article summarizes the current literature on how animal operations may affect the value of residential properties located near such facilities; this information will be useful to practicing appraisers faced with valuing houses in these communities.

as environmental concerns arise when waste runoff is discharged onto adjacent landscapes and waterways.⁷

As the structure of the livestock industry has trended toward concentration of more animals in fewer operations, state and local governments also have acknowledged the problems associated with large operations by enacting legislation imposing stricter regulations on CAFOs and increasing separation distances.⁸ For example, in North Carolina the following mandatory setbacks are imposed on new or expanded farms with 250 or more hogs: 1,500 feet from occupied residences, 500 feet from any residential property boundary to swine houses and lagoons, and 75 feet from any residential property boundary to sprayfield boundaries.

Overall, the empirical evidence indicates that residences near AOs are significantly affected, and data seems to suggest a valuation impact of up to 26% for nearby properties, depending on distance, wind direction, and other factors. Further, there has been some suggestion that properties immediately abutting an AO can be diminished as much as 88%. One study estimates the total negative impact to property values in the United States at \$26 billion.⁹ Mitigation makes a marginal impact. Not only are residences affected, but nearby small farms can be impacted by such factors as water degradation and insects.

Environmental Impacts and Regulation of Animal Operations

AOs are generally recognized to affect the surrounding environment in several key ways: air quality and

odors (ammonia, hydrogen sulfide, methane, and particulate matter), greenhouse gas and climate change, insect vectors (often carrying resistant strains of pathogens), groundwater and surface water contamination, and a variety of pathogens.¹⁰

Data from the USDA and the EPA estimate that livestock in the United States produce 150 times the total amount of manure as the entire human population of the country. For example, one hog excretes nearly three gallons of waste per day or 2.5 times the average human's daily total. A 3,000-sow AO will produce about 25 tons of manure a day.¹¹ A similar number of chickens will produce about 700 pounds of manure per day (plus or minus 30%), containing about 9 pounds of nitrogen gas, 7.5 pounds of phosphorus pentoxide (a powerful irritant and corrosive) and over 4 pounds of potassium oxide, a highly reactive deliquescent that reacts violently with water to produce potassium hydroxide.¹² Manure from livestock production can contain bacteria (salmonella, E. Coli 0157:H7), parasites, viruses, and antimicrobials (antibiotics and vaccines).¹³ Excessive levels of phosphorus in land and water have been correlated with livestock density; and manure has caused eutrophication and degradation of US waterways.¹⁴

AOs are regarded as potential sources for contamination because of the large amounts of manure that they produce, and because the proximity in which the animals are confined allows for disease to be easily transferred.¹⁵ A 2006 outbreak of E. coli 0157:H7 was associated with the consumption of fresh spinach that had been in contact with water contaminated with animal feces.¹⁶ One of the

leading causes of food and waterborne illness in the United States is this E. coli 0157:H7 organism, which is a specific strain of the Escherichia coli bacteria commonly found in the intestines of healthy cattle. One means of transfer of E. coli to humans occurs when untreated manure is able to enter water sources or used for fertilization.¹⁷ The EPA acting under the Clean Water Act has designated AFOs as point sources of pollution and requires that they have zero discharge or apply for a permit that requires an extensive waste management plan. Despite regulatory efforts to segregate manure-related contaminants from the water supply, contaminants still may enter the supply because of flooding, leaching into the soil, or through disregard of regulations.

In addition to water quality issues related to manure and waste run-off, animal operations facilities attract flies and other insects and parasites.¹⁸

As noted in Kilpatrick, state entities began regulating AFOs in the late 1990s.¹⁹ In 2000–2001, the EPA began levying fines against concentrated beef production facilities in the Northwestern United States that met two criteria: the facility confined animals for at least 45 non-consecutive days per year and the confinement area was devoid of vegetation. The rules generally applied to any operation with 300 head of cattle or more. At the time of the regulations, the EPA estimated that this would affect between 26,000 and 59,000 AFOs in the United States.²⁰

On December 11, 2002, the EPA issued its final revised regulations.²¹ The regulations affirmed the prior definitions of AFOs and CAFOs, provided for an explicit duty to apply for a permit, established required performance standards and best management practices, and explicitly required nutrient management plans.²²

Overview of AO Impacts on Property Values

An AO can affect the value of proximate properties in two ways. First, AOs have a substantial indirect negative economic impact on surrounding communities, including property values in those communities, via shifts in sources of purchases and other inputs in the factors of production. An early study by Chism and Levins reports that smaller farms make nearly 95% of their expenditures locally, while larger operations spend less than 20% locally.²³ Gomez and Zhang study 1,106 rural communities and conclude that economic growth rates in communities with conventional farming are 55% higher than in those with AOs.²⁴ They document the negative impact of AOs on the economy of the surrounding community, as revealed by sales tax receipts and reduced local purchases. They note that conventional farmers buy most or all of their supplies locally, thus stimulating the local community and, by extension, stimulating the local real estate market. On the other hand, AOs bypass local retailers and import the factors of production. Gomez and Zhang state that AOs exacerbate the economic negative impact by “importing” large quantities of pollution and the attendant costs; they also find AOs cause “disruption of local social and economic systems, pollution problems resulting from intensive agriculture, and negative impacts on the quality of life in rural communities.” This finding replicates those of an earlier study by Abeles-Allison and Connor, which showed AOs have the effect of crowding out more traditional farmers and decreasing purchases in local stores.²⁵

Hence, local communities suffer the negative economic byproducts without the attendant economic benefits.

7. The USDA and EPA first regulated animal operations under the 1999 “Unified National Strategy for Animal Feeding Operations,” see <http://water.epa.gov/polwaste/npdes/afo/Animal-Feeding-Operations-Regulations.cfm>. The USDA Economic Research Service presents a discussion of regulatory issues related to animal waste at <http://www.ers.usda.gov/topics/animal-products/animal-production/marketing/issues/policy-regulatory-issues.aspx#regulatory>. Up-to-date information on the Clean Water Act is available at <http://www2.epa.gov/laws-regulations>.

8. Joseph Hengges, Silvia Secchi, and Bruce A. Babcock, “Living with Hogs in Iowa: The Impact of Livestock Facilities on Rural Residential Property Values” (Iowa State University Center for Agricultural and Rural Development working paper, August 2003).

9. Doug Gurian-Sherman, *CAFOs Uncovered: The Untold Cost of Confined Animal Feeding Operations* (Cambridge, MA: Union of Concerned Scientists, 2008).

10. Carrie Hribar, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities* (National Association of Local Boards of Health, 2010), available at http://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf.

11. Don Hopey, “Study Finds Large Hog Farms Lower Property Values,” *Post-Gazette* (June 7, 2003).

12. Jing Tao and Karen Mancel, “Estimating Manure Production, Storage Size, and Land Application Area,” Ohio State University, 2008 Agricultural Fact Sheet. According to a study by the University of Wisconsin-Madison, the average chicken farm has 14,500 birds, with farm sizes ranging up to 50,000 birds; see UW-Madison College of Agricultural and Life Sciences, Center for Integrated Agricultural Systems, Research Brief 63, January 2003.

13. EPA, *Literature Review of Contaminants in Livestock and Poultry Manure*.

14. Stephen Jann, “Recent Developments in Water Pollution Control Strategies and Regulations,” presentation at ABA Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations, Minneapolis, MN (May 12, 1999).

15. “National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations (CAFOs); Final Rule,” *Federal Register* 68 (February 12, 2003). Note that portions of this were subsequently overturned in *Waterkeeper Alliance v. EPA*, 399 F.3d 486.

16. “FDA Finalizes Report on 2006 Spinach Outbreak,” FDA (March 24, 2007), <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2007/ucm108873.htm>.

17. “Disease Listing, Escherichia Coli 0157:H7, Gen Info,” Centers for Disease Control and Prevention, <http://www.cdc.gov/ecoli/>.

18. Stuart A. Smith, “Concentrated Animal Feeding Operations—Resources for Environmental Responsibility” (working paper prepared by Smith-Comeskey Ground Water Sciences, April 1, 2000); for additional information see <http://www.groundwaterscience.com/resources/tech-article-library/100-concentrated-animal-feeding-facilities-resources-for-environmental-responsibility.html>.

19. John A. Kilpatrick, “Concentrated Animal Feeding Operations and Proximate Property Values,” *The Appraisal Journal* (July 2001): 301–306.

20. Peggy Steward, “Cattlemen Find CAFO Rules Confusing,” *Capital Press Agricultural Weekly* (March 9, 2001): 9.

21. Claudia Copeland, “Animal Waste and Water Quality: EPA Regulation of Concentrated Animal Feeding Operations (CAFOs),” Congressional Research Service Report for Congress No. 7-5700, February 16, 2010. The regulations were published in the *Federal Register* on February 12, 2003 and went into effect on April 14, 2003.

22. <http://water.epa.gov/polwaste/npdes/afo/>. Permitting is under the EPA’s National Pollutant Discharge Elimination System (NPDES) program, which regulates the discharge of pollutants from point sources; CAFOs are defined as point sources by the Clean Water Act.

23. John W. Chism and Richard A. Levins, “Farm Spending and Local Selling: How Do They Match Up?” *Minnesota Agricultural Economist* 676 (1994): 1–4.

24. Miguel Gomez and Lijiang Zhang, “Impacts of Concentration in Hog Production on Economic Growth in Rural Illinois” (Illinois State U. working paper presented at annual meeting of American Agricultural Economics Association, July 30–August 2, 2000).

25. M. Abeles-Allison and L. Connor, *An Analysis of Local Benefits and Costs of Michigan Hog Operations Experiencing Environmental Conflicts* (Agricultural Economic Report 536, Department of Agricultural Economics, Michigan State University monograph, 1990).

Second, AOs impact values at the individual residential value level. Property values are impacted as market participants view the AO as a negative externality. As an externality, it is not typically considered economically curable under generally accepted appraisal theory and practice. Hence, the value diminution attributable to proximate location of an AO can be attributed to stigma. The next section discusses case studies regarding the effects of AOs.

Proximity Case Studies

Kilpatrick presented a series of case studies from the 1990s that document the impacts of AOs.²⁶ For example, a Minnesota homeowner lived near two swine AOs when her family reportedly became ill and testing found that the level of hydrogen sulfide was well above the danger levels.²⁷ An early study in North Carolina by Schiffman et al. reports emotional impacts (tension, depression, anger, reduced vigor, fatigue, and confusion) linked to airborne contamination emanating from an AO.²⁸ A later North Carolina study by Wing and Wolf reports increased incidences of headache, runny nose, sore throat, excessive coughing, diarrhea, burning eyes, and “reduced quality of life.”²⁹ An early study in Iowa by Thu et al. finds increases in eye and upper-respiratory problems among those living within 2 miles of an AO.³⁰ A later Iowa study³¹ finds extensive literature documenting acute and chronic respiratory disease and dysfunction among CAFO workers from exposures to complex mixtures of particulates, gases, and vapors; it concludes that CAFO air emissions may constitute a public health hazard.

Ables-Allison and Connor were among the first to examine property value impacts resulting from

airborne contamination and odors.³² Examining 288 sales between 1986 and 1989, they find that for every thousand animals added within a 5-mile area, there is an average sale price drop of \$430 per property, with the most significant losses within 1.6 miles. Notably, they find that during the first half of 1989 an AO with greater than 500 animals was 50 times more likely to have an odor complaint lodged with the state than one with fewer than 500 animals.³³

Taff, Tiffany, and Weisberg perform a hedonic price analysis on 292 rural residences in Minnesota and find a statistically significant pricing impact related both to the existence of an AO as well as the distance to the AO.³⁴ A 1996 study by Padgett and Johnson finds that homes within 0.5 mile of a CAFO decrease in value by 40%, and homes within 1.0 mile decrease in value by 50%, within 1.5 miles by 20%, and within 2.0 miles by 10%.³⁵ Palmquist, Roka, and Vukina quantitatively determine that AOs depress nearby home values. They develop a model to measure the spatial impacts of AOs and, like Padgett and Johnson, find differential value impacts at 0.5, 1.0, and 2.0 miles.³⁶

Hamed, Johnson, and Miller, quantify both the average value impact of an AO as well as the impact by distance with a study of 99 rural, non-family real estate transactions of more than one acre near an AO. Thirty-nine of the properties in the study included a residence. An average residential parcel within 5 miles of an AO experienced a loss of about 6.6%. However, if that parcel was located within 0.10 mile of the AO (the minimum unit of measure in the study), then the loss in value was estimated at about 88.5%.³⁷

Additional empirical studies have supplemented these findings. Kim and Goldsmith analyze property values of 2,155 homes located within 5 miles of an AO in North Carolina. The principle focus of their study is spatial hedonics, and within a 5-mile area they find the average impact to be negative 18%. At 1 mile, they find the impact is negative 25.5%.³⁸

Weida studies the economic and financial impact of CAFOs. While this study principally focuses on the diminished economic growth rates in communities surrounding CAFOs, it also notes the substantial decreases in property values in those areas, as evidenced by property tax reductions.³⁹

Kueth and Keeney find that the negative impacts of AOs are comparable to those generated by industrial waste, solid waste, and septic waste facilities.⁴⁰ They focus on airborne-related problems and note that odor is a particular source of nuisance, and higher-valued residences are more severely impacted.

The odor and airborne particulate issues also have been explored in a more recent study by Isakson and Ecker. They examine the impact of swine CAFOs on sale prices of 5,822 houses in Iowa. The study shows large adverse impacts for houses located within 5 miles and directly downwind from a CAFO—a loss of value of as much as 44.1%. Value loss diminished to 16.6% for houses not directly downwind, and loss in value decreased to 9.9% for houses directly downwind but 5 miles away. Isakson and Ecker also find a correlation between CAFO size and value loss; a 10% increase in CAFO size resulted in a 0.67 % decrease in house price as far as 7 miles from the nearest CAFO.⁴¹

Studies Using GIS

Increasingly, AO studies have relied on geographic information systems (GIS) technology and other spatial methods to investigate property value impacts.

Worley Rupert, and Risse use GIS to examine the efficacy of buffers to mitigate AO impacts.⁴² They find that adding buffers to animal operations reduces the amount of land available within an area for such operations.

Cajka, Deerhake, and Yao present a study technique using GIS and modeling software to investigate the dispersion of air pollution emanating from CAFOs. The advantage of this approach is it looks at cumulative emissions from multiple sources.⁴³

Milla, Thomas, and Ansine, study homes in Craven County, North Carolina, use a GIS-based hedonic pricing model to evaluate the impacts of CAFOs, particularly hog operations, on residential property values. Their results indicate a negative and significant impact on property value from hog operations and a relationship between distance to hog farms and property sale prices. They determine that a farm with 5,000 animals has a statistically significant impact on values of homes 1 mile away, with an impact on the average home of 3.1%.⁴⁴

Based on the results of the case studies, it is quite apparent that significant externalities are associated with animal feeding operations, that the relationship between externalities, farm characteristics, and community attributes can be quite complex, and that negative impacts of animal facilities, as reflected in lowered property values, can extend beyond established setbacks. The GIS-based studies suggest the externalities associated with AOs are a function of distance and that the GIS-based hedonic price modeling is a promising method for assessing property value damages associated with animal operations, for evaluating potential impacts when siting new operations, and for developing setback guidelines.

26. Kilpatrick, “Concentrated Animal Feeding Operations.”

27. Presentation at ABA Special Committee on Agricultural Management Roundtable II.

28. Susan S. Schiffman, Elizabeth A. Miller, Mark S. Suggs, and Breckin G. Graham, “The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents,” *Brain Research Bulletin* 37, no. 4 (1995): 369–375.

29. S. Wing and S. Wolf, “Intensive Livestock Operations, Health, and Quality of Life Among North Carolina Residents,” *Environmental Health Perspectives* 108, no. 3 (March 2000): 233–238.

30. K. Thu, K. Donham, R. Ziegenhorn, S. Reynolds, P. Thorne, P. Subramanian, P. Whitten, and J. Stookesberry, “A Control Study of the Physical and Mental Health of Residents Living Near a Large-Scale Swine Operation,” *Journal of Agricultural Safety and Health* 3, no. 1 (1997): 13–26.

31. *Iowa Concentrated Animal Feeding Operations Air Quality Study—Final Report* [End Itail], Iowa State University and the University of Iowa Study Group (February 2002), http://www.public-health.uiowa.edu/ehscr/CAFOstudy/CAFO_final2.14.pdf.

32. Ables-Allison and Connor, *Analysis of Local Benefits and Costs of Michigan Hog Operations*.

33. As previously discussed, this study also reports that AOs affect the economics of local communities.

34. Steven J. Taff, Douglas G. Tiffany, and Sanford Weisberg, “Measured Effects of Feedlots on Residential Property Values in Minnesota: A Report to the Legislature” (U. Minnesota Staff Paper Series, July 1996), <http://ageconsearch.umn.edu/bitstream/14121/1/p96-12.pdf>.

35. Reported in William J. Weida, “The CAFO: Implications for Rural Economies in the US” (Colorado College working paper, February 24, 2004), <http://www.columbus.in.gov/planning/staffreports/gellius-materials-part-1/>.

36. R. Palmquist, F. Roka, and T. Vukina, “Hog Operations, Environmental Impacts, and Residential Property Values,” *Land Economics* 73, no. 1 (1997): 114–124.

37. Mubarek Hamed, Thomas Johnson, and Kathleen Miller, “The Impacts of Animal Feeding Operations on Rural Land Values,” University of Missouri-Columbia, Community Policy Analysis Center Report R-99-02 (May 1999).

38. Jungik Kim and Peter Goldsmith, “A Spatial Hedonic Approach to Assess the Impact of Swine Production on Residential Property Values,” *Environmental and Resource Economics* 42, no. 4 (April 2009): 509–534.

39. William J. Weida, “Potential Regional Economic Effects of CAFOs” (Colorado College working paper, August 24, 2001), available at <http://sraproject.org/wp-content/uploads/2007/12/commentsonthepotentialregionaleconomicseffectsoffeedlots.pdf>.

40. Todd H. Kueth and Roman Keeney, “Environmental Externalities and Residential Property Values: Externalized Costs Along the House Price Distribution,” *Land Economics* 88, no. 2 (2002): 241–250, available at <http://naldc.nal.usda.gov/naldc/download.html?did=54130&content=PDF>.

41. Hans R. Isakson and Mark D. Ecker, “An Analysis of the Impact of Swine CAFOs on the Value of Nearby Houses,” *Agricultural Economics* 39, no. 3 (November 2008): 365–372.

42. J. W. Worley, C. Rupert, and L. M. Risse, “Use of GIS to Determine the Effect of Property Line and Water Buffers on Land Availability,” *Applied Engineering in Agriculture* 17, no. 1 (September 2000): 49–54; available at <https://www.ito.usga.edu/library/buffers.pdf>.

43. Jamie Cajka, Marion Deerhake, and Chengwei Yao, “Modeling Ammonia Dispersion from Multiple CAFOs Using GIS,” *Proceedings of the 24th ESRI Users Conference*, August 9–13, 2004, available at <http://proceedings.esri.com/library/userconf/proc04/docs/pap1381.pdf>.

44. Katherine Milla, Michael H. Thomas, and Winsbert Ansine, “Evaluating the Effect of Proximity to Hog Farms on Residential Property Values: A GIS-Based Hedonic Price Model Approach,” *URISA Journal* 17, no. 1 (2005): 27–32.

Legal and Regulatory Actions

Legal and regulatory actions also can reveal the impacts of AOs on nearby properties. For example, in 2000, Central Industries operated a large-scale poultry rendering plant near Central, Mississippi. As part of the process, large quantities of poultry processing byproducts were brought to this facility for further processing. The plant had been subject to a number of flooding events, spreading bacteria-laced poultry byproducts into nearby creeks and downstream rivers. Poultry byproducts were discovered up to 50 miles away from the rendering plant. For violations of the Clean Water Act, company officers were fined varying amounts up to \$500,000 each, and the company was fined \$14 million.⁴⁵ Researchers found property value diminution of up to 60% for farms closest to the plant, and transaction prices impacted as far as 11 miles away.

In numerous counties across the country tax assessors have granted property value reductions as a result of proximity to AOs. For example, Beasley reports that Clark County, Illinois, established a property tax abatement for fifty homes around a swine AO. Homes within 0.5 mile were determined to have values diminished by 50%, ranging down to a 10% reduction in value for homes at 1.5 miles.⁴⁶

Aiken reports that the Nebraska Court of Appeals ruled that county board of equalization erred in not considering a rural residence's proximity to a swine facility in determining the residence's valuation. The owner of the facility also built a house 0.75 mile away and obtained an easement to spray the hog manure on the cropland across the road from the house. The court ordered the county to ignore the fact that the swine were also the property of the owner. The court cited Nebraska livestock nuisance decisions that show that hog odors would influence the home's value. Upon the ruling, the county accepted a determination by a local, independent appraiser that the value was diminished 50%.⁴⁷

Spears reports that in the summer of 2003, health officials declared about 40 kilometers of beaches on

Table 1 Property Tax Reductions in Areas Around AOs

Area	Amount of Reduction	Property Type
Grundy Co, MO	30%	
Mecosta Co, MI initially:	35%	Dwellings only
later changed to:	20%	Land and structures
Midland Co, MI	20%	
DeWitt Co, IL	30%	
McLean Co, IL	35%	
DeKalb Co, AL	Base reassessment, variable rates	
Renville Co, MN	Base reassessment, variable rates	Dwellings only
Humbolt Co, IA	20%-40%	Dwellings only
Frederick Co, MD	10%	
Muhlenberg Co, KY	18%	Dwellings only

Lake Huron permanently unsafe because of E. coli bacteria emanating from nearby AOs. This became the first new pollution hot spot on Canada's side of the Great Lakes in almost twenty years. Lab tests demonstrated that the E. coli levels in the streams feeding Lake Huron, and draining off nearby AOs, exceeded water quality standards by as much as 41,000 percent.⁴⁸

Ready and Abdalla expand upon the hedonic analyses of others and reviewed the amenity and disamenity impacts of agriculture in Berks County, Pennsylvania, including different types of open space (publicly owned, eased, vacant, pasture/crops), landfills, airports, mushroom production, and AOs. The study determines that "only landfills have a worse effect on adjacent property values,"⁴⁹ and further states, "a sewage treatment plant has less depressing effects on nearby housing prices

than a factory farm operation." The study also finds that the clustering of AOs within a certain area is the controlling factor, not the location of the nearest operation when considering proximity. The study reports a value impact of -4.1% from AOs within 800 meters, and at least -6.4% from within 500 meters, both of which were half the impact of a landfill at comparable distances. The study did not find any statistically significant difference in the effects based on AO size or species.

Herriges, Secchi, and Babcock expand upon previous work on AO price effects by using variables to quantify the effects in a hedonic analysis of proximity, size, and direction of nearest facility. Direction from site was included to determine the effect of being downwind, and the odor and pest issues associated with AOs. Results from this study indicate that a moderate-size facility has a value impact up to -6% within 1.5 miles and -26% within a 0.25 mile.⁵⁰

Finally, Keske documents ten lawsuits over AO nuisance in which the plaintiff prevailed, with jury awards ranging up to \$50 million (Table 2). The size of these awards suggests that preventive measures, even if expensive, might be cost effective.⁵¹

Summary of AO Empirical Findings

The establishment of an AO results in value diminution to nearby properties, both through a negative

externality as well as through indirect economic impacts. The amount of the value loss is an inverse function of distance (closer properties diminish more), a function of property type (newer, nicer residences lose more), and a function of property use (farms will lose value due to diminished productivity and comparative marketability to farm lands further away; residential use will no longer be a highest-and-best use). The empirical studies and case studies results indicate diminished marketability, loss of use and enjoyment, and loss of exclusivity that can range up to nearly 90% of otherwise unimpaired value for homes that are adjacent to the facility. Negative impacts are noted at distances exceeding 5 miles, and in the case of a flood or other weather event, waste from the facility can be spread over far greater areas, extending the area of negative impact (Table 3).

Mitigation of Impacts

There is surprisingly little empirical evidence of attempts to mitigate either the physical impacts or the perception of negative externality of AOs given the fairly consistent evidence of negative impacts on surrounding property values. The most significant and transcendent impacts are to surrounding community values and economics and to air quality. However, neither of these is well suited to mitigation efforts. Generally, mitigation fall into three categories: waste management plans, tree windbreaks, and anaerobic

Table 2 Damage Awards Related to AOs

Year/State	Jury Award	Case/Remarks
1991/NE	\$375,600	<i>Kopecky v. National Farms</i> , swine operation
1996/KS	\$12,100	Swine settlement – parties undisclosed in news article
1998/KS	> \$15,000	<i>Twietmeyer v. Blocker</i> , beef operations
1999/MO	\$5,200,000	<i>Hanes v. Continental Grain</i> , swine operation
2001/OH	\$19,182,483	<i>Seelke v. Buckey Egg Farm</i> , poultry
2002/IA	\$33,065,000	<i>Blass v. Iowa Select Farms</i> , swine operation
2004/OH	\$50,000,000	<i>Bear v. Buckey Egg Farm</i> , poultry
2006/AL	\$100,000	<i>Sierra Club v. Whitaker</i> , swine
2006/MO	\$4,500,000	<i>Turner v. Premium Standard Farms</i> , swine
2007/IL	\$27,000	State of Illinois (respondent unreported), swine

Source: Catherine M. H. Keske, "Determining the Economic Feasibility of Anaerobic Digestion in Colorado: Guidelines for Animal Farm Producers," CSU Extension Fact Sheet 1.229 (2012).

50. Herriges, Secchi, and Babcock, "Living with Hogs in Iowa."

51. Catherine M. H. Keske, "Determining the Economic Feasibility of Anaerobic Digestion in Colorado: Guidelines for Animal Farm Producers," CSU Extension Fact Sheet 1.229 (2012), <http://www.ext.colostate.edu/pubs/livestk/01229.pdf>.

Table 3 Summary of Studies of AO Value Impacts

Case Study	Value Loss	Remarks
Ables-Allison and Connor (1990)	\$430 within 5 miles	Greatest impact within 1.6 miles
Taff, Tiffany, and Weisberg (1996)	N/A	AO sited near older, less-expensive homes
Palmquist, Roka, and Vukina (1997)	9%	Average up to 2 miles
Hamed Johnson, and Miller (1999)	6.6%–88%	Largest loss if within 0.10 mile
ABA Presentation (1999)	N/A	Confirmed respiratory problems
Central Industries (2000)	60% for farms closest to plant	USDOJ cases, values by appraisal
Beasley (2001)	Up to 30%	Impacts 10% at 1.5 miles
Aiken (2002)	30% @ 0.75 mile	Confirmed by court and local appraiser
Spears (2003)	N/A	40 km of beaches closed due to AO emissions
Herriges, Secchi, and Babcock (2003)	26% at 0.25 mile	Moderate-size AO, 6% at 1.5 miles
Weida (2004)	40% at 0.50 mile	10% at 2 miles
Ready and Abdalla (2005)	Residence at 0.25 mile > 6.4% Residence at 0.50 mile 4.1%	Roughly half the impact of a landfill
Kim and Goldsmith (2008)	23.5% at 1 mile	18% average within 3-mile radius
Isakson and Ecker (2008)	44%	Directly downwind and within 2 miles

Source: Catherine M. H. Keske, "Determining the Economic Feasibility of Anaerobic Digestion in Colorado: Guidelines for Animal Farm Producers," CSU Extension Fact Sheet 1.229 (2012).

digestion. Nonetheless, such mitigation does not appear to have an economically material impact on nearby property values.

Waste Management Plan

Laws or regulations typically require wastewater runoff treatment. However, some facilities go beyond that with actual waste management plans. There is some evidence that such plans will have marginal impact, as noted in the Ready and Abdalla study, which found a residential value differential of 4.2% versus 1.1%. Notably though, some of the most severe impacts have occurred near facilities with mandated waste management plans, particularly when and after those plans failed. For example, in one four-month period, the Central Industries facility studied by Ready and Abdalla committed approximately 1,114 permit violations, exceeding the pollutant limitations set forth in the company's permit by hundreds of percentage points and exceeding its permitted flow rate by millions of gallons. Hence, the efficacy of a waste management plan must be taken in the light of potential impacts of violations.⁵²

Planting Trees

The University of Delaware, College of Agriculture and Natural Resources, studied the planting of windbreaks around poultry houses to reduce odor, dust, feathers, and noises, and suggests that this approach can also ameliorate nitrogen in the groundwater.⁵³ However, several aspects regarding this mitigation study should be noted:

1. The study focus is on protecting the poultry houses themselves, not adjacent or nearby neighbors.
2. Establishment of an effective windbreak takes quite a few years and quite a few trees.
3. A windbreak may partially ameliorate view problems but does not seem to address the major issues of odor and other airborne contaminations (particles, insects, etc.).

Anaerobic Digestion Facility

The purpose of Keske's study was to provide guidance on the financial feasibility of a biogas-fueled cogeneration facility.⁵⁴ The study recognizes the significant production of flammable biogas by AOs and notes the feasibility of biogas-fueled cogeneration

is limited by a number of factors. First, the up-front costs can be prohibitive—typically \$1.2 million, and up to \$5 million depending on the technology used. Also, annual operating costs are significant, and while these technologies are sold with the promise of offsetting electric bills, Keske notes that in the study area (Colorado) electricity rates are already lower than other parts of the United States. Hence, AO operators should be "particularly wary of relying on anaerobic digestion to generate revenues by selling electricity to the utility." Finally, Keske notes that for a biogeneration facility to be feasible, at least two of the following criteria must be met:

1. The AO meets the definition of a confined AFO.
2. The waste stream can be combined with the waste stream of another operation or business (e.g., food manufacturing, municipal waste).
3. The AFO already receives frequent odor complaints.
4. The AFO produces swine or chickens (the two most egregious sources of biogas).
5. The AFO incurs more than \$5,000/month in average electricity or heating charges.

Keske notes that given the high threshold of cost of this mitigation approach, the approach is feasible only if it outweighs costs associated with not implementing a mitigation plan. As previously mentioned, to support this Keske documents ten lawsuits in which claimants were awarded as much as \$50 million for agricultural nuisance (Table 2). Notably, the two largest awards cited (\$50 million and \$19 million) were for poultry operations.⁵⁵

Summary and Conclusions

Since *The Appraisal Journal's* previous review of AO effects on proximate property values,⁵⁶ new study approaches have been identified. First, there has been an increased use of GIS by local governments, which has given researchers the ability to

conduct more thorough investigations. GIS provides researchers with more data—in abundance and in detail—and allows researchers to better locate which factors, and to what degree, have an effect on value.

Second, in conjunction with more data and use of GIS, there are substantial improvements in the hedonic analyses performed. Keske noted that early studies (such as the Taff, Tiffany and Weisberg study and the Palmquist, Roka, and Vukina study) were conducted on fewer than 500 sales transactions each, while the later study by Ready and Abdalla reviewed 8,090 sales, and the Herriges, Secchi, and Babcock study examined 1,145 sales transactions.

Third, because of the increased use of GIS and the results from the hedonic analysis in newer case studies, it has been shown that an AO's basic impact is related to proximity and size, but there are also other factors, such as the operations' waste management practices, that can reduce or exacerbate that impact. Overall, the new studies confirm the valuation impacts reported in earlier studies, as they range from 3.1% to 26% loss depending on multiple factors, and that properties immediately abutting an AO can be diminished as much as 88%. More importantly, however, is the discussion of the impact of other site-specific factors that were considered as part the hedonic analyses.

With respect to mitigation efforts, the Ready and Abdalla study of Berks County (Pennsylvania) shows that at 800 meters an operation with a waste management plan diminishes a house's value 1.1%, while an operation without such a plan would diminish the value 4.2%. Also related to this is the effect of operation size on property values. Both the Ready and Abdalla study and the Herriges, Secchi, and Babcock study show that a larger facility in close proximity would not necessarily decrease the value of a nearby property more than a smaller facility. Both of the studies concluded that this effect could be attributed to unmodeled characteristics such as waste management practices and other site-specific attributes.

52. Ready and Abdalla, "The Amenity and Disamenity Impacts of Agriculture."

53. George W. Malone, "Environmental and Production Benefits of Trees for Poultry Farms," U. Delaware Cooperative Extension Service (2001).

54. Keske, "Determining the Economic Feasibility of Anaerobic Digestion."

55. Ibid.

56. Kilpatrick, "Concentrated Animal Feeding Operations."

John A. Kilpatrick, PhD, MAI, is the managing director of Greenfield Advisors and is a visiting scholar in real estate finance at the Zicklin School of Business, Baruch College. He is the author or a contributing author to eight books, including *Private Real Estate Markets and Investments*. His research has been published in *The Appraisal Journal*, *Journal of Real Estate Research*, *Journal of Housing Research*, *Real Estate Issues*, *Journal of Property Investment and Finance*, *Journal of Wealth Management*, and *Journal of Real Estate Literature*. His work in real estate appraisal has been featured in *The Wall Street Journal*, *The New York Times*, and *The Boston Globe*, among others. **Contact: john@greenfieldadvisors.com**

Web Connections

Internet resources suggested by the Y. T. and Louise Lee Lum Library

eXtension Land-Grant University Cooperative Research Information
—Geospatial Technology

http://www.extension.org/geospatial_technology

—Animal Manure Management

http://www.extension.org/animal_manure_management

Food & Water Watch—Factory Farms

<http://www.foodandwaterwatch.org/food/factoryfarms/>

Texas A&M University, Texas Animal Management Issues Clearinghouse

<http://tammi.tamu.edu/index.html>

US Department of Agriculture, National Agricultural Library

<http://www.nal.usda.gov/topics>

US Environmental Protection Agency

—Agriculture Center

<http://www.epa.gov/agriculture>

—Drinking Water Regulations

<http://water.epa.gov/lawsregs/rulesregs/sdwa/currentregulations.cfm>

—Animal Feeding Operations Overview

<http://water.epa.gov/polwaste/npdes/afo/index.cfm>



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January 3, 2017

Curtis J. Bedwell, MAI
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Subject: Hawai'i Dairy Farms Final Environmental Impact Statement (EIS)
Māhā'ulepū, Kōloa District, Kaua'i, Hawai'i
Response to Comment on Draft EIS

Dear Curtis J. Bedwell:

Thank you for your letter dated July 20, 2016 regarding the Hawai'i Dairy Farms (HDF) Draft EIS. The following responses are offered to your comments:

The HDF project purpose is to establish a sustainable, pastoral rotational-grazing dairy farm that will increase current local milk production, bolster Hawai'i's declining dairy industry, and reduce reliance on imported milk from the mainland United States. The rotational-grazing dairy system utilizes 100 percent of all manure on-site as natural fertilizer to grow grass. This cost-effective method reduces imported fertilizer and feed, and minimizes potential impacts to the environment. HDF reflects a viable approach to apply use of Important Agricultural Lands to agricultural self-sufficiency and food production. HDF represents a continued commitment by the landowner to support farming and local food production, and to aid in the resurrection of Hawai'i's dairy industry.

Comments by Kilpatrick about the adverse economic impacts of the dairy appear to be based on nuisance parameters and footprints of conventional feedlot dairies found on the mainland, not on those of the planned Dairy which will be a modern facility that uses rotational pasture-grazing. Results of technical studies presented in this EIS show no unmitigated nuisances that could affect property values as a result of dairy construction or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort and residential areas. The review of property values adjacent to beef cattle operations in the Kōloa region reveals newer homes with large square footage in a luxury residential community with 2016 assessed values of \$1,297,150 per lot, to \$2,893,100 per lot with a home. The proposed dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

ATTACHMENT 7

**GROUP 70 INTERNATIONAL RESPONSE LETTER TO CURTIS J. BEDWELL, DATED
JANUARY 3, 2017**

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John A. Kilpatrick, PhD, MAI, is the managing director of Greenfield Advisors and is a visiting scholar in real estate finance at the Zicklin School of Business, Baruch College. He is the author or a contributing author to eight books, including *Private Real Estate Markets and Investments*. His research has been published in *The Appraisal Journal*, *Journal of Real Estate Research*, *Journal of Housing Research*, *Real Estate Issues*, *Journal of Property Investment and Finance*, *Journal of Wealth Management*, and *Journal of Real Estate Literature*. His work in real estate appraisal has been featured in *The Wall Street Journal*, *The New York Times*, and *The Boston Globe*, among others. **Contact: john@greenfieldadvisors.com**

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US Environmental Protection Agency

—Agriculture Center

<http://www.epa.gov/agriculture>

—Drinking Water Regulations

<http://water.epa.gov/lawsregs/rulesregs/sdwa/currentregulations.cfm>

—Animal Feeding Operations Overview

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January 3, 2017

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Subject: Hawai'i Dairy Farms Final Environmental Impact Statement (EIS)
Māhā'ulepū, Kōloa District, Kaua'i, Hawai'i
Response to Comment on Draft EIS

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Curtis J. Bedwell
January 3, 2017
Page 2 of 2

Your comment, along with this response, will become part of the public record and will be published in the Final EIS. When published, the Final EIS will be available on the OEQC website which you can access using the following URL, and search "Hawai'i Dairy Farms": <http://tinyurl.com/OEQCKAUAI>.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.



Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Attn: Laura McIntyre

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Attn: Jeff Overton

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Hawai'i Dairy Farms, LLC.

P.O. Box 1690
Kōloa, HI 96756-1690
Email: jim@hawaiidairyfarms.co

Comments to be considered for Hawaii Dairy Farms EIS, TMK 4-2-9-003-001 and 006, 4-2-9-001-001

My former concerns in my letter of February 23, 2015 have not been answered and I now have even more questions. I find the economic analysis lacking substantiation and incompatible with research by Dr. John Kilpatrick and his letter to Mayor Carvalho, which shows a devaluation of south shore properties by 26% to 88%, and the entire island of Kauai negatively affected by an increased tax rate. I have been a south shore realtor for 35 years and I cannot understand how anyone would consider spoiling the pristine area of Mahaulepu, with a project that is hazardous to the island and our health, would devalue our property and depress current business. This DEIS, as done by the architectural design company of the Dairy, does not protect the public interest.

Clearly the evaluation of alternative sites was insufficient, failing to consider interior locations on Kauai or the other islands and other credible opportunities for agricultural crops on the Mahaulepu site. Evidently the New Zealand model no longer suffices and the EIS should specify an exact model, noted only as from "the world's best island models." The waste management plan is totally inadequate anyway. It proposes to contain all waste on the property then admits runoff will occur. Why aren't the ditches terminated on the property with huge catchment basins or a septic system implemented? It doesn't look like the soil would support them either. Then the EIS should model the clean-up process, forecast as millions or billions for similar coastline areas, and provide bonds for those costs, which will otherwise be the burden of state, county, and taxpayers.

The south shore includes Kauai's major hotel and condominium resorts, expensive vacation homes and residences, popular beaches and other tourist activities. The tax base of this area depends upon its popularity, which would be severely impacted by a dairy farm close by, shown to be much more significant than any revenue from the proposed Dairy. Trends show that an intrusion like this one

ATTACHMENT 8

**BERYL BLAICH COMMENT LETTER TO THE DEPARTMENT OF HEALTH AND GROUP
70 INTERNATIONAL, DATED JULY 24, 2016**

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July 24, 2016

Laura McIntyre
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Jeff Overton
Group 70 International
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HDF@Group70int.com

Submitted via E-mail to all parties.

Subject: Consulted Party Comments on Draft Environmental Impact Statement (DEIS) for Hawaii Dairy Farms' Proposed Dairy Operation

To Whom It May Concern:

Because the Hawaii Dairy Farms HDF has recently sent amended technical information to the Hawai'i State Department of Health (DOH), I am requesting that the comment period for this DEIS be reset after all changes to the EIS, supporting studies and dairy operational documents be distributed to interested parties.

I am grateful that HDF undertook this Environmental Impact Statement (EIS). I have read the entire EIS, including all the technical studies. I have learned more about the operational logistics and geographic scope of the project, the hydrology, soils and the existing stream water pollution at Māhā'ulepū. However, I found the DEIS lacking in economic and fiscal analysis, an inventory of the near shore marine resources that will be impacted by dairy runoff and actual mitigation measures.

Economic and Fiscal Impacts - Unanswered Questions, Missing information

The Demographic and Economic Analysis "Hawai'i Dairy Farms: Demographic and Economic Assessment" (Plash Econ Pacific (PEP) Inc., May 2016) is incomplete. The study does not meet standards for an EIS economic assessment, lacking an adequate cost-benefit analysis as well as assessment of consumer demand for HDF milk.

The dairy is intended to be "financially and environmentally sustainable," a "model" for other dairies "of investment in IAL and of successful capital investment." (Vol. 1, p. 1-4)

With a herd size of 699, the economic impact study projects annual sales of \$10,121,716 and total profits of \$1,012,172. It provides little basis for this projection.

From the information provided it is not possible to assess whether this costly project would be profitable or financially sustainable in the future. Three elements of cost-benefit analysis are missing:

1. Product Price

The expected price per gallon of the milk produced, even a range of projected prices, at which HDF milk will be purchased by the wholesaler/processor is not disclosed in this "disclosure document." (Table III-3 Economic Impacts At Full Operations)

2. Operating Costs

The only expenditures disclosed in Tables III - 2, 3, 4 and 5 are for construction, payroll and property taxes. The following annual operating expenses (even just estimated) are not stated: annual land lease (does this lease include any charge for irrigation water or potable water?), cost of purchasing the initial cows, estimated cost of feed, cost of insemination of the heifers, cost of boarding resting heifers, estimated costs of auxiliary personnel such as veterinarians, cost of consultants utilized for monitoring, if any, cost of agricultural insurance, liability insurance, workers health insurance, and cost of equipment maintenance or replacements.

3. Market Study

PEP did not conduct a marketing study. The goal of bolstering local milk production is only viable if enough buyers want and are willing to pay for the milk. What is the consumer demand for the locally grown, non organic milk that HDF will be producing? What are Hawai'i consumers - residents? visitors? institutions? - willing to pay for the "local" milk grown at Māhā'ulepū? What is the trend in Hawai'i regarding milk consumption? Can HDF milk compete with imported mainland milk? Will the milk have to be sold outside of Hawai'i? Where?

4. Buyer

HDF does not have a buyer for its milk. Meadow Gold/Dean Foods was supposed to purchase and process HDF milk. Apparently, despite more than two years of negotiations, HDF still does not have a milk purchase and processing agreement. This unknown is more than an "unresolved issue." If HDF has to undertake milk processing on 'O'ahu or on Kaua'i, it will incur substantial additional construction and operating expenses, which will increase the price of the milk.

Analysis of Potential Economic Costs to the Region:

The PEP Economic Impact Study acknowledges the economic importance of the Koloa-Po'ipu region: "As mentioned previously, 36% of the island's visitor units are in Po'ipu and Kukui'ula, including the Grand Hyatt Kauai Resort & Spa which is the largest employer in the County." It states that "If nuisance impacts were to occur — which is not expected—it could result in reduced tourism, sales, employment, salaries and wages, property values, personal wealth, State and County tax revenues, enjoyment of homes and recreational activities" (Vol. 2. p. 644)

It is the responsibility of the economic analysis to quantify this regional economic value and the potential loss should "nuisances" including odors, air pollution, pests, noises not be controlled. The study fails to attempt to do so, even to its own accuracy standard of within about 25%" (p. 1.Vol 2, I-3) Instead, it restates the conclusions and proposed control measures put forth by the other EIS studies regarding pests, air quality, odor. The Economic and Fiscal analysis is entirely deficient, indeed negligent in this respect.

Further, Māhā'ulepū provides economic value as an undeveloped watershed. I hoped that the EIS would use the natural capital framework and methodology such as Invest, a package of modeling software created by Stanford University scientists to assess the value of an area's natural capital. This valuation of the worth of the ahupua'a of Māhā'ulepū would provide a monetary component to the NoBuild Alternative and would also help to actually value the impact of potential environment degradation.

Unaddressed Significant Cumulative Impacts

The Surface Water Quality and Marine Assessment Study (Marine Research consultants, Steven Dollar, May, 2016) is also deficient. Ten nutrient runoff events from the dairy into ditches, streams and the ocean are anticipated every year. This runoff is apparently unavoidable and will not be contained by setbacks, filter strips and buffer plantings. "Using NRCS curve number method to compute runoff for the sites' B and D class soils and irrigated pasture in good condition, it is estimated that actual runoff into drainage ways from HDF pasture will only occur when rainfall exceeds 0.8 inches. Based on the 30 year daily rainfall record for the areas such events are estimated to occur approximately three percent of days, or an average of 10 days annually. (TNWRE, 2016 (Vol1. p. 4-66, 4-67) (Volume 2, p. 1.4-2, p. 1-14)

This nutrient load of nitrogen, phosphorus and bacteria etc. will be added to an already polluted ecosystem. The DOH Māhā'ulepū Sanitation survey estimates groundwater and coastal waters of south-east Kauai are being contaminated by wastewater from the Waikomo Watershed injection wells and cesspools with roughly 3 MGD of wastewater daily (CWB 2016) (Vol 1.p. 4-58). "The agricultural ditch and intermittent streams

showed degraded water quality parameters for nutrients and pathogens. Elevated levels in these water courses is due to the low flow conditions and varied inputs from the agricultural lands and natural contributions from the watershed" (CWB, 2016) (Vol 1. P. 4-62).

This added on-going nutrient load from the dairy constitutes a cumulative negative impact on environmentally sensitive areas including the stream, estuary, beach and coastal waters. The Marine Assessment Study dismissed the impact of these ongoing runoff events. After studying the near and off shore water quality at four transects on **one** day, October 6, 2014, the "zone of mixing" was assumed to be relatively predictable with "currents flowing in a westerly direction." The marine analysis did not study the currents along the Māhā'ulepū coast, which do not always flow in one direction. Higher surf conditions were assumed to simply add more water, more dilution, to stream outflow. The description of the stream/ditch outflow area is also inaccurate, or, at best, a single limited snapshot of a constantly changing estuary. Sometimes the stream flows directly into the ocean. Other times it flows east along the beach almost to the Gillin property.

The marine study stated that the stream is "not likely provide value as a unique biotic habitat, functioning mainly as a drainage way." However, there was no survey of existing stream biota. I have seen āholehole in the Waiopili "Ditch" up near the bridge in the Makauwahi Cave Reserve, as well as kōloa duck.

Lack of a Marine Inventory

In order to determine whether an action "will have a significant effect, curtail beneficial uses, substantially affect social welfare or cultural practices of the community, involve substantial degradation of environmental quality," the EIS must provide information about those potentially affected resources. There was no baseline inventory of the nearshore marine resources along the Māhā'ulepū Coast, including Māhā'ulepū Beach and Kawailoa Bay. Such a study would have assessed corals, limu, invertebrates, fish, monk seals and other species. Fishing and gathering are historic and on-going cultural and recreational practices at Māhā'ulepū. These same coastal resources, long used by many Kauai families are the very resources the dairy will impact, yet the DEIS neglects to study their current health and abundance, or to consider potential effects.

Inadequate Mitigation – Monitoring and Insurance

"The draft EIS shall consider mitigation measures proposed to avoid, minimize, rectify or reduce impacts." (Content Requirements: Draft Environmental Impact Statement HAR 11-200-16 M.) This model of a pastoral rotational-grazing dairy has not been "proven" in Hawai'i. The hydrology and soils and agronomy studies explicated how complex,

experimental and risky this undertaking is in this particular locality, making proposed mitigation measures critically important.

Monitoring:

The following statement encapsulates the need for regular, robust and transparent monitoring within and in the vicinity of the dairy. "No part of this system is stable" (Soils and Agronomy Analysis, Yost and Kruger). Monitoring is key to successful production of grass and milk, as well as to prevent and minimize risks to the environment and human health both on the dairy and in its surroundings. The results of the on-going monitoring should be the actual basis for evaluating the dairy, "contemplating" herd increases and determining the "carrying capacity" of the site.

The EIS does identify the need and intention to monitor nutrients in the soils of each "mapunit," the nutrient content of the forage, the nutrient content of the manure (on fields and in sediment/effluent), the nutrients in groundwater, nutrients, bacteria and turbidity in surface water, nutrients, bacteria and turbidity in marine water, dung beetle numbers and activity in the manure and soils, levels of greenhouse gases and odors. The DEIS asserts that "The dairy's "precision agricultural technology" promises a higher degree of monitoring capacity and transparency." Appendix D: Baseline Nutrient Balance Analysis (Group 70 and Red Barn Consulting 8.7)

However, the DEIS does not set forth a comprehensive monitoring program. The Final EIS must provide for robust, regular and transparent monitoring as a critical mitigation measure. Such a program would include:

1. a full list of what will be monitored,
2. what kinds of tests will be conducted
3. the frequency of testing,
4. who will be conducting the tests, whether dairy personnel or consultants,
5. what conditions will trigger additional tests,
6. and how and to whom (both the public and government agencies) test results will be disseminated. The qualifications and training of monitors is critical. Tom Nance Water Resource Engineering (TNWRE) identified "operating skills of the HDF personnel as a primary challenge to managing nutrients."

Insurance:

"The draft EIS shall include, where possible, specific reference to the timing of each step proposed to be taken in any mitigation process, what performance bonds, if any, may be posted and what other provisions are proposed to assure the mitigation measures will in fact be taken" (HAR 11-200-17 M). HDF must carry a large environmental insurance policy in order to "rectify" potential environmental and public health damages. Even a large policy might still only provide small compensation for irreparable losses and would need to include funding for remediation. In addition, HDF should establish a social and environmental remediation endowment, partially funded by

a portion of milk sales. The existing DEIS assumes there will be no negative impacts to mitigate, and includes no provisions for insurance.

Conclusion

The Draft EIS does not fully address the significant potential impacts of the dairy to Māhā'ulepū or the surrounding community. The scope of investigation focuses on the immediate dairy lands, and neglects to consider impacts on near-by sensitive ecosystems such as Makauahi cave and the coast, or cumulative impacts on the stream. The final EIS should include inventories of the stream and near shore marine resources to be impacted by dairy runoff, as well as significantly improved economic and fiscal analysis. Finally, the DEIS does not provide adequate mitigation measures including a comprehensive monitoring plan.

Thank you to all concerned.
Respectfully and with aloha,

Beryl Blaich
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ATTACHMENT 9

**GROUP 70 INTERNATIONAL RESPONSE LETTER TO BERYL BLAICH, DATED
JANUARY 3, 2017**

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January 3, 2017

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Beryl Blaich
January 3, 2017
Page 2 of 5

Subject: Hawai'i Dairy Farms Final Environmental Impact Statement (EIS)
Māhā'ulepū, Kōloa District, Kaua'i, Hawai'i
Response to Comment on Draft EIS

Dear Beryl Blaich:

Thank you for your letter dated July 24, 2016 regarding the Hawai'i Dairy Farms (HDF) Draft EIS. The following responses are offered to your comments:

The planned Hawai'i Dairy Farms ("HDF" or "Dairy") will be the first in Hawai'i to employ rotational pasture-grazing. Benefits of pasture grazing includes, but is not limited to, improved grass growth, even deposits of manure for fertilization, and reduced erosion and runoff. Also, the Dairy will feature modern facilities and practices, and will comply with all applicable Federal and State environmental standards.

Economic Analysis

Your comments request in-depth analysis of the dairy business and justification of the dairy in terms of products, pricing, costs, markets and buyers. As a private agricultural business operation, HDF is not required to issue details on its business model and financials, as it is not a requirement of the EIS. This farming operation on agricultural zoned lands does not require discretionary land use reclassification and vetting of financial aspects of the business and markets. We cite two government sources that document the lack of local production milk and milk products on Kaua'i and the State of Hawai'i, and the long-term demand for these products locally and statewide.

- The US Department of Agriculture and State of Hawai'i Department of Agriculture issues annual summary data on the statewide production of agricultural products, including milk and dairy products. National Agricultural Statistics Service is found at https://www.nass.usda.gov/Statistics_by_State/Hawaii/.

- In July 2015, the County of Kaua'i and University of Hawai'i issued Important Agricultural Lands study (Draft Final version) documenting the long-term demand for agricultural products to sustain the people of Kaua'i, including demand for milk and dairy products. The report is posted at <https://sites.google.com/site/kauaiial/>.

HDF intends to sell raw milk to an offsite milk processor/packager, as described in Section 3.6 of the EIS. While it is likely the processor will ship the milk to O'ahu for final processing and packaging, two options are described to utilize the now closed Meadow Gold facility in Pūhi. Such decisions will be made by the processor once milk is available from HDF. An alternative for HDF to pasteurize raw milk on Kaua'i is evaluated in EIS Section 6.6.

Results of technical studies and the findings of this EIS show no unmitigated nuisances that could affect property values as a result of dairy construction or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. Odor is a nuisance impact that may reach beyond the dairy boundaries but will be limited to adjacent farm and ranch lands owned by Mahaulepu Farm, LLC, lessor of the dairy site, and would occur for limited and infrequent duration. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area. EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

Surface Water Nutrients

Complaints from the public citing the high levels of enterococcus in Waipili Ditch and concerns about the proposed dairy prompted the Hawai'i State Department of Health (DOH) Clean Water Branch (CWB) to conduct a "Sanitary Survey" of the Māhā'ulepū sub-watershed and the adjacent Waikomo watersheds. DOH CWB conducted water sampling within the Waipili Ditch and areas upstream, and initiated a series of investigations into water quality issues. The Sanitary Survey findings resulted in an expression of concern by DOH CWB that the number of injection wells and cesspools in the adjacent Waikomo watershed, which includes Kōloa and Po'ipū, are impacting the waters of the Waipili Ditch.

Nutrients are provided by nutrient contributions from surrounding lands, where there is no management of manure from wild animals, decaying organic matter from trees and leaves, and other sources of nutrients. HDF will improve conditions by managing the pastures, creating a thick kikuyu grass thatch to control runoff and nutrient flow through the environment, and control animals through set rotations. Nutrients will be taken up by the pasture and will not be added past the agronomic need of the crop. This is all expected to increase soil health, improve runoff conditions, and control nutrient pass through.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to minimize impacts to waterways. Physical setbacks will be created with fences installed 35-feet from drainageway (totaling 70-feet in width) to keep cows away from surface waters. Within the 35-foot setback, vegetation will be established to create filter strips to capture particulates during stormwater runoff. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways. See Section 3.5.1, Paddocks, Fencing and Setbacks in the EIS. Elements of the Nutrient Management Plan developed for HDF are described in the EIS Section 3.5.4.2 *Nutrient Balance* and are included in the *Nutrient Balance Analysis for Hawai'i Dairy Farms* attached to the EIS as Appendix D.

In terms of nutrient loading, HDF will not apply nutrients past the plant uptake requirements and agronomic need. In both the 699 mature dairy cow and 2,000 mature dairy cow scenarios, at a grass yield of 16.3 tons of DM per acre per year, there is simply not enough nitrogen nutrient from manure sources (as-excreted, liquid effluent, slurry applied) and a slight excess of phosphorus. HDF will not apply excess phosphorus because the herd size would be increased incrementally, to ensure no over-application of nutrients. Ultimately, commercial fertilizers will still be required. Nutrients are broken down quickly and absorbed by the crop. Cows are rotated so over-application of nutrients does not occur.

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HDF has adapted the “New Zealand model” – pastoral-based rotational grazing dairy – to U.S. standards and best management practices. NRCS provides extensive guidance for agricultural operations to meet stringent standards including those under the Clean Water Act. Nutrient management is a key tenet, and the protection of waterways has been applied to the design of HDF paddocks using fencing to create large setbacks from drainages.

Waiopili Ditch receives runoff from the larger 2,700-acre Māhā‘ulepū Valley sub-watershed, including the lands mauka and makai of the proposed dairy. The dairy site represents roughly 20 percent of the sub-watershed. Soil erosion within the dairy will be reduced by establishment of the thick grass ground cover for pasture and filter strips along drainageways. Over the long-term, the surface water quality in the agricultural ditches and Waiopili Ditch will be improved by active management of the dairy site.

Long-term ocean water quality monitoring has been initiated to provide a baseline for the nearshore ocean waters. HDF will regularly sample and analyze nutrient and chemical constituent levels in the near-shore marine environment. Data from the nearshore water monitoring program will be made available to the DOH CWB, dairy neighbors and the local Kaua‘i community, and will allow for evaluation of possible contamination sources.

Marine Environment Baseline Assessment

MRCI conducted a marine environment baseline assessment to assess the nearshore environment offshore of the discharge point for the man-made Waiopili Ditch drainage channel. The survey collected a quantitative data set to evaluate the composition of the benthic marine habitats and resources in the offshore area, including corals, algae, fish and invertebrates. Appendix F includes the marine baseline assessment.

The Māhā‘ulepū area is an open coastal area directly exposed to long-period south swells and trade wind generated east swells, which create physical forces that strictly limit coral community structure and related benthic communities. The overall structure consists of a submerged basaltic shelf extending across the nearshore study area, with wide plains of white sand flats seaward of the basaltic shelf. Distinct biotypes show bottom composition of flat pavement with patches of red alga (*Asparagopsis taxiformis*) and scattered coral heads of pioneering species (*Pocillopora meadrina*) that are adapted to high-energy zones. Pillow lava formations near the study area are nearly devoid of reef corals and macroalgae. The western portion of the study area has some zones with lower wave energy exposure, which showed more developed coral species and cover, at a distance of over 600 m from the drainage ditch channel discharge point. The marine environmental assessment confirms the understanding of the existing baseline nearshore conditions, which reflects a high-energy regime with very limited coral colonies, and less robust benthic invertebrate and fish communities. This assessment can be found in the addendum to Appendix F.

With the future dairy operation, the minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment that actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of physical mixing of water masses. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the EIS as Appendix F.

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The surface water quality report found in Appendix F of the EIS states the nearshore receiving environment is an area typified by extreme energy during all seasons. Such extreme energy, primarily in the form of waves and currents, serves to rapidly disperse input from stream discharge. Hence, the time that the marine environment is exposed to episodic inputs of storm runoff is very short, and the limited marine species that occupy the area are capable of withstanding such impacts. There is also a large body of scientific literature documenting that reef corals do not require low nutrient water. For example, a multitude of corals from around the Pacific Basin growing at the Waikiki Aquarium live in high nutrient marine groundwater and have higher linear growth rates than corals in the wild. Hence, there is no reason to expect that a short-term exposure of a very limited community to elevated nutrients will result in any negative impacts to corals and associated marine life in the mixing zone of Waiopili Ditch and the ocean.

There will be ongoing natural inputs to Waiopili Ditch contributed from the overall watershed and the agricultural lands bordering the ditch downstream of the dairy. With the measures being taken by the dairy to actively manage surface runoff, nutrients and suspended sediments, concerns about the potential effects of dairy operations to ocean beach recreation are not anticipated.

Comprehensive Monitoring

The dairy will conduct a comprehensive monitoring program for meteorology, pasture soils, pasture grasses, groundwater, surface waters and marine waters. There will be daily monitoring of factors which are essential to the pasture management and health and production of the dairy cows. Pasture-based dairy farmers are essentially grass farmers, as the health of the pasture crop is critical to the health and production of the dairy cows. Agronomic conditions of the soils are monitored continuously to observe moisture levels and other factors.

Monitoring of groundwater quality and ditch surface water quality will be sampled and analyzed on a quarterly basis by consultants to test for nutrient levels and other constituents. Marine water quality monitoring will also be conducted by consultants on a quarterly basis. During episodic high rainfall periods which produce runoff flows in the agricultural ditch, there will be sampling and testing to assess the constituent levels from individual events. Since these peak ditch flow events are infrequent, dairy personnel will be trained to observe ditch flows, take samples from designated locations following technical protocol, and transfer these samples to the laboratory for analysis. Results from quarterly monitoring will be made available to the DOH CWB, dairy neighbors and the local Kaua‘i community, and allow for evaluation of monitoring results.

Agricultural Operations

The operation of the dairy will be conducted with a high level of sensitivity to the environment, as evidenced in the substantial level of planning detail and technical information presented in the EIS. The dairy will implement significant measures to minimize environmental impacts, and several substantial monitoring programs will be conducted to provide essential feedback to refine and improve mitigation programs and dairy operations.

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Your comment, along with this response, will become part of the public record and will be published in the Final EIS. When published, the Final EIS will be available on the OEQC website which you can access using the following URL, and search "Hawai'i Dairy Farms": <http://tinyurl.com/OEQCKAUAI>.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.



Jeffrey H. Overton, AICP, LEED AP
Principal Planner

July 21, 2016

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Dear Colleagues:

I am writing to comment on Hawaii Dairy Farms (HDF) Draft Environmental Impact Statement (DEIS). I have reviewed the documents and appendices, and I conclude that the DEIS is deficient in answering a number of material questions.

Alternatives to the Proposed Action. The Environmental Impact Statement Rules, Hawaii Administrative Rules Chapter 11-200 requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. Implicit in that statement is an assumption that the proposed alternatives **can actually be constructed**. Hawaii Dairy Farms has failed to address alternatives in a meaningful and responsive way. Although it claims to have engaged in "rigorous exploration and evaluation of alternatives" (DEIS Volume 1: 6-1), the alternatives presented in the DEIS fall short of demonstrating that any real alternatives have been considered.

According to HAR 11-200-10(6), alternative analysis should include input from the community. HDF has failed to address the community's concerns regarding the location of the proposed dairy in Mahaulepu.

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